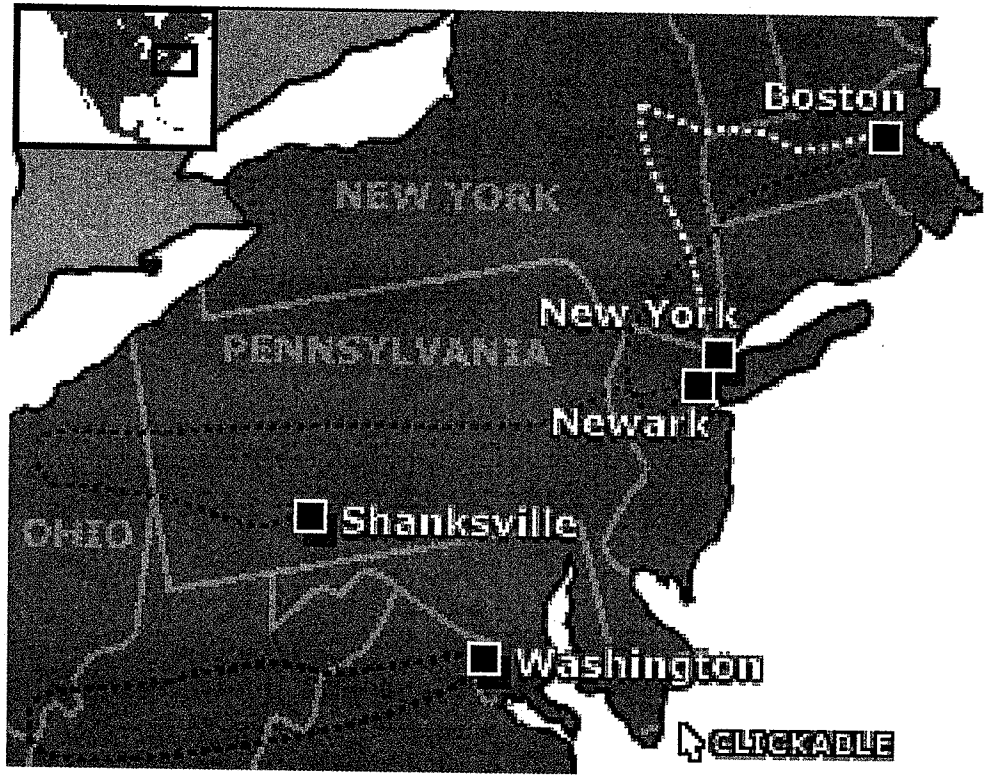
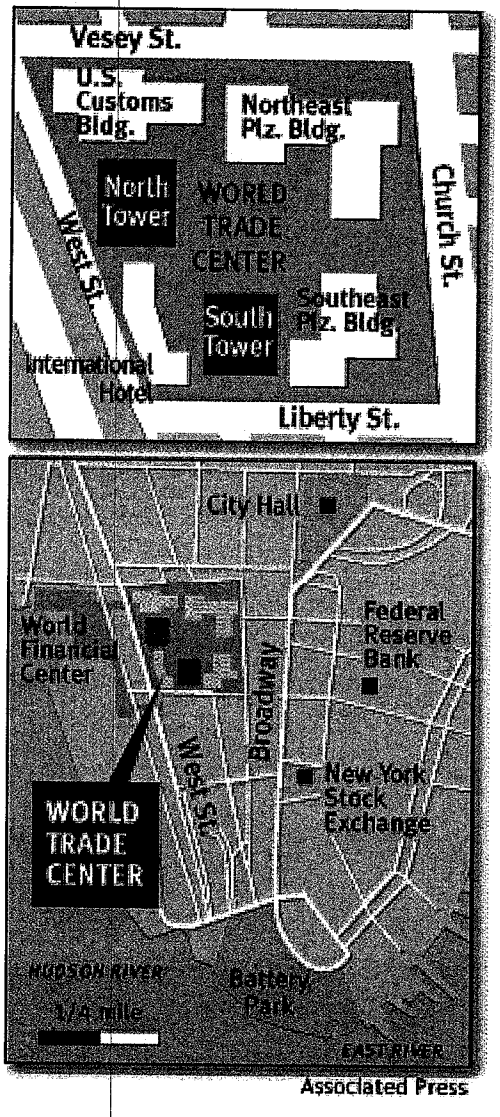
Routes Of The Four Highjacked Planes On the Morning of September 11, 2001



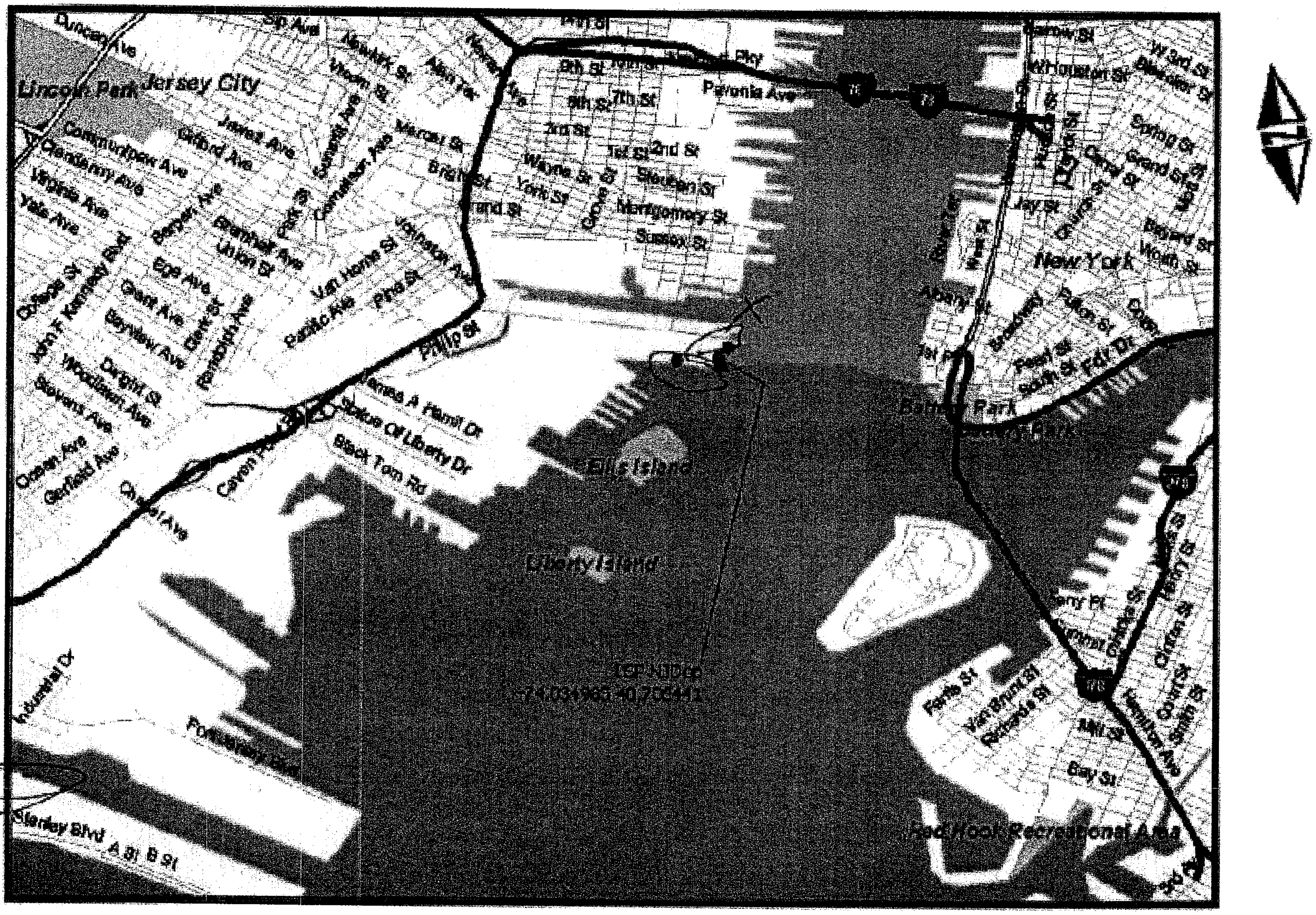
World Trade Center Infrastructure



DR-1391-NY New York City
Building Status - September 22, 2001

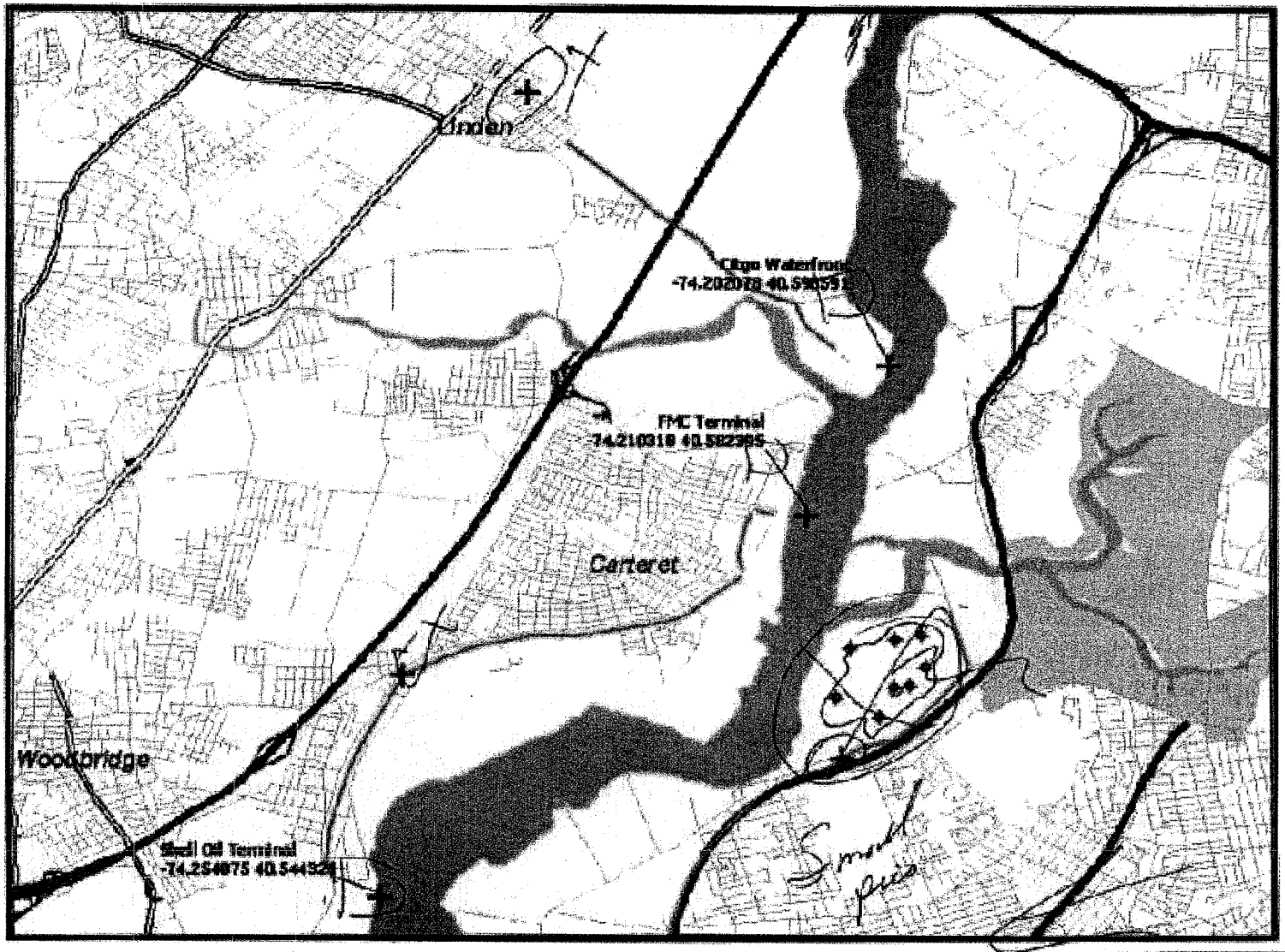
STATUS

- search completed building cleared
- collapsed
- needs verif
- unsafe to enter



U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
68-C99-223
W.A.#R1A52001

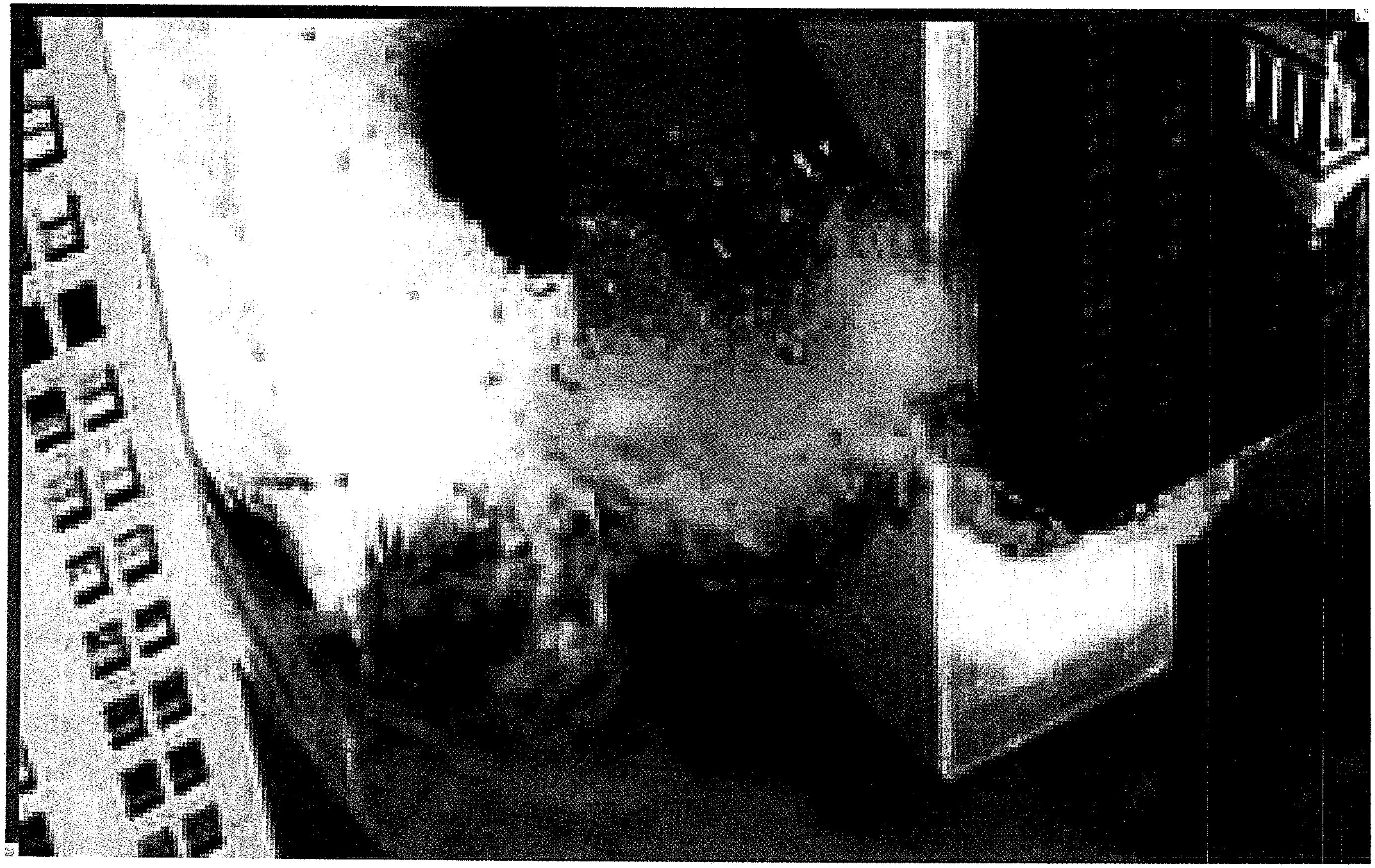
Arthur Kill NJDep
Liberty State Park
Field Map 1
September 2001

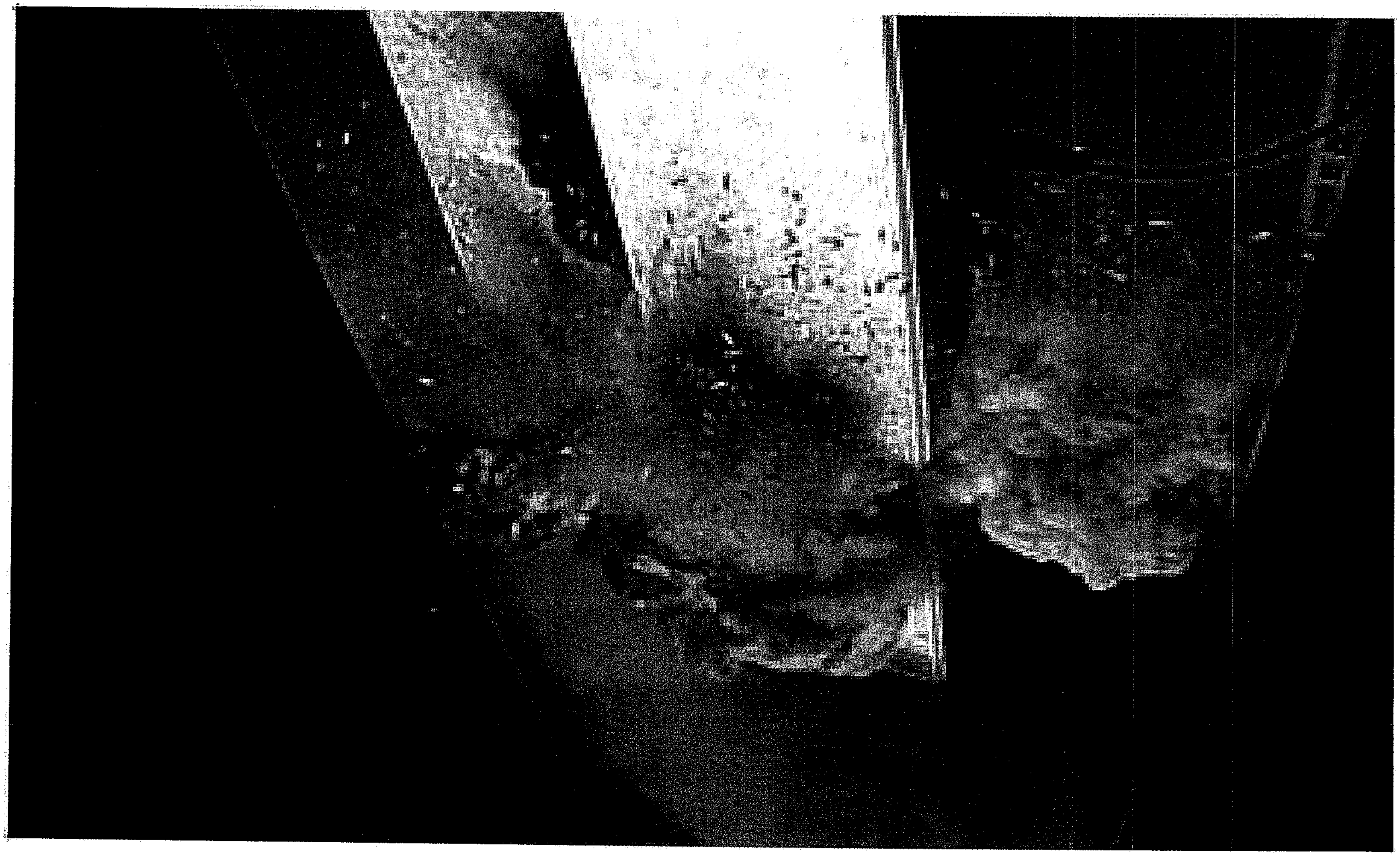


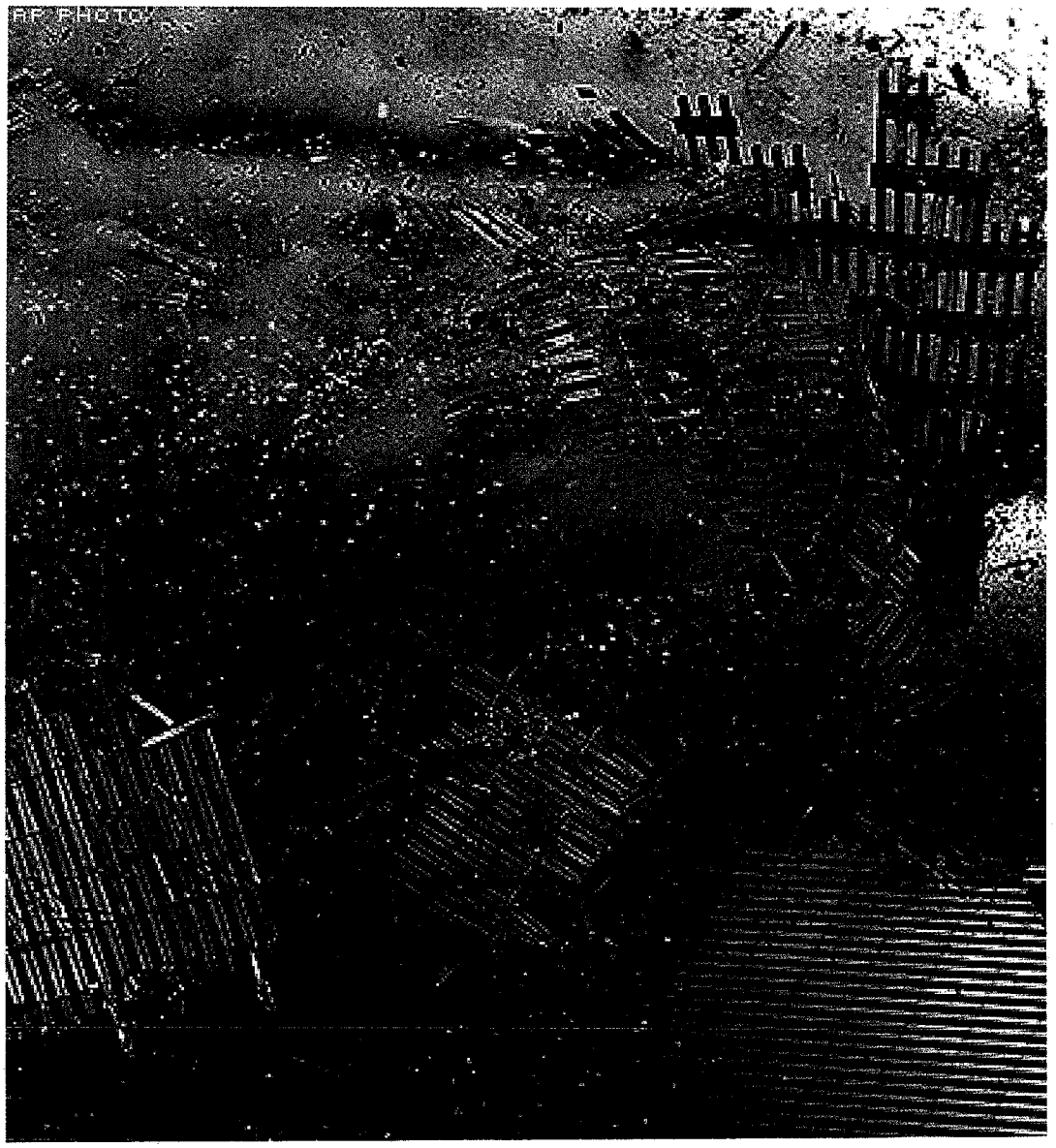
U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
68-C99-229
W.A.#R1A52001

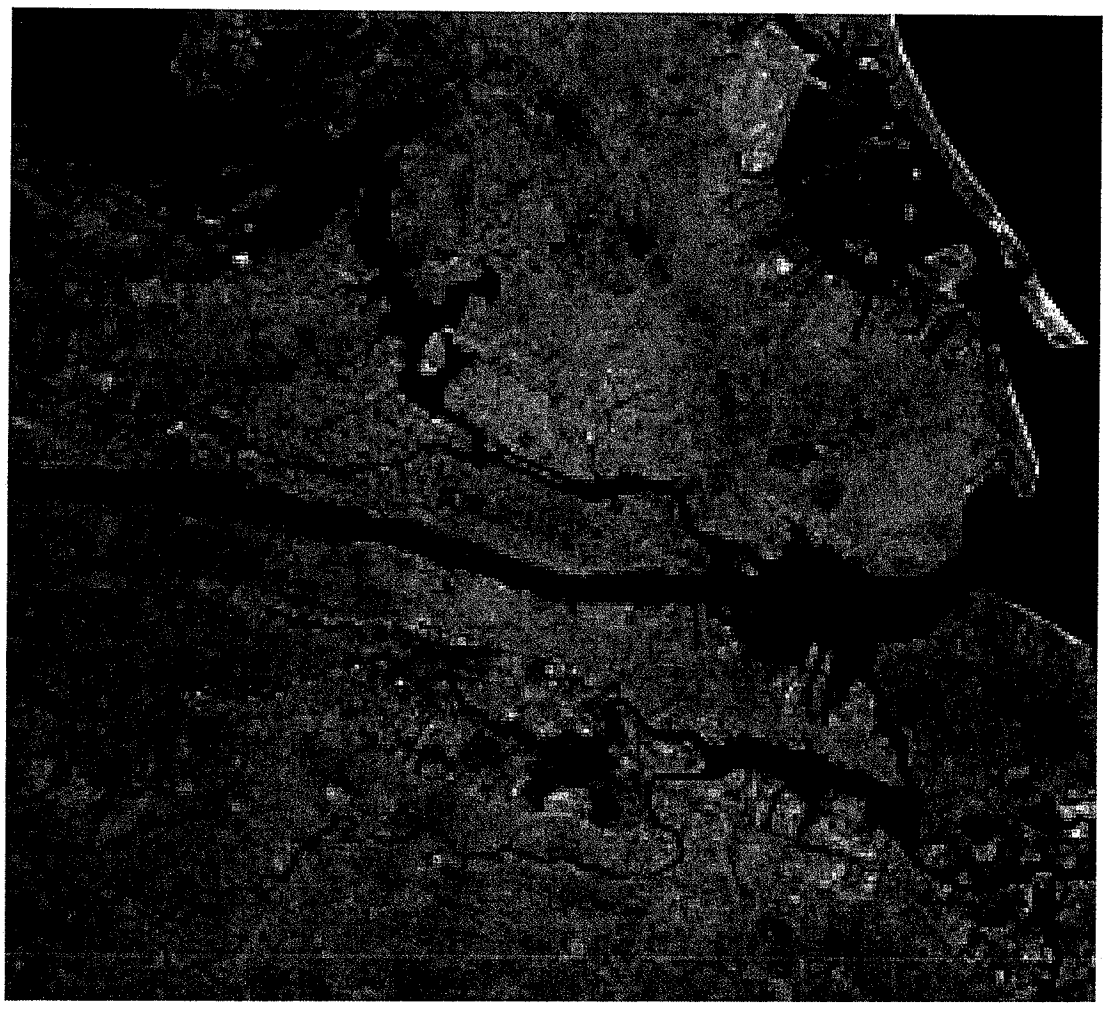
Arthur Kill NJDep
Freshkills Landfill
Field Map 1
Staten Island, NY
September 2001

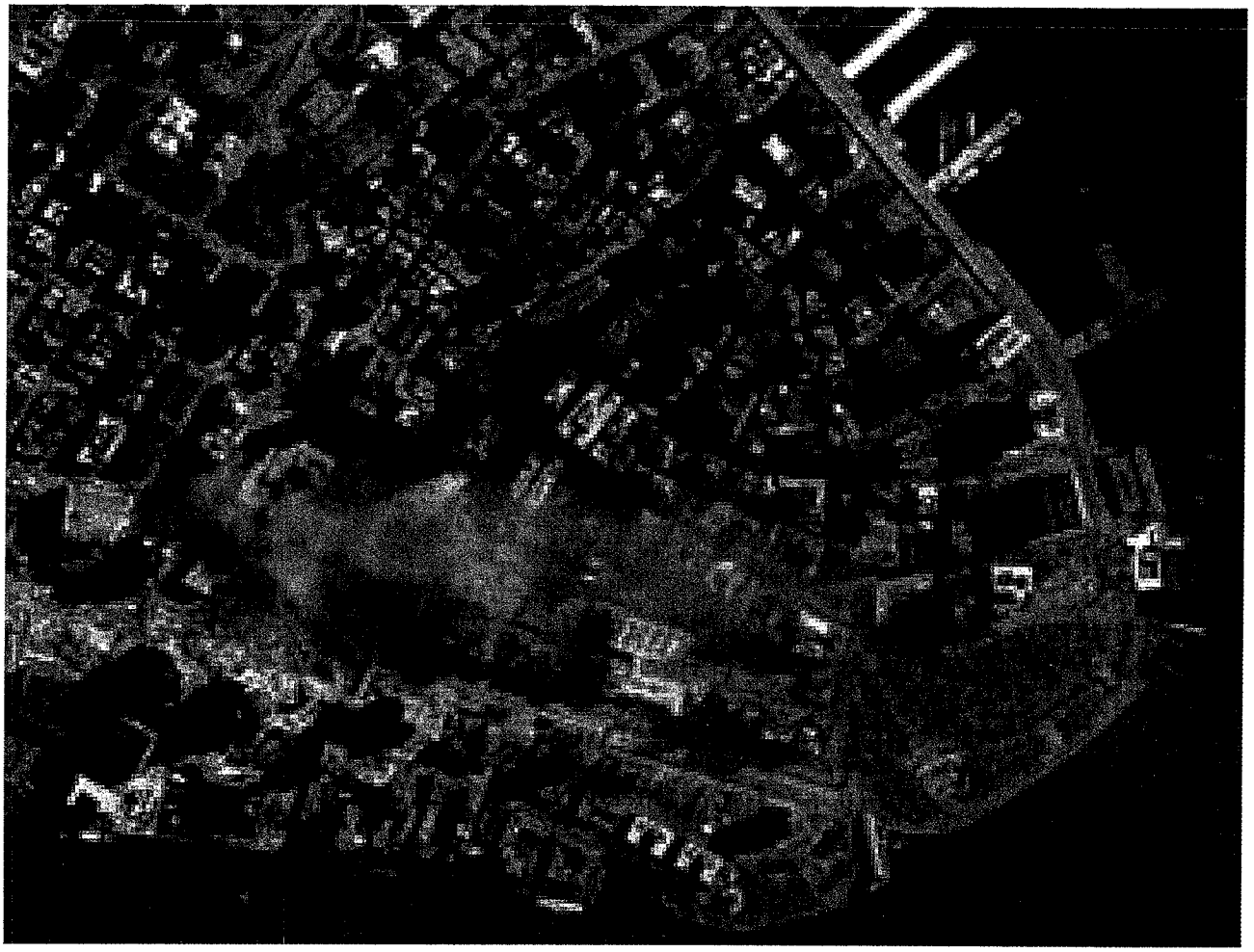
Fresh Kills Landfill
12:00 hrs



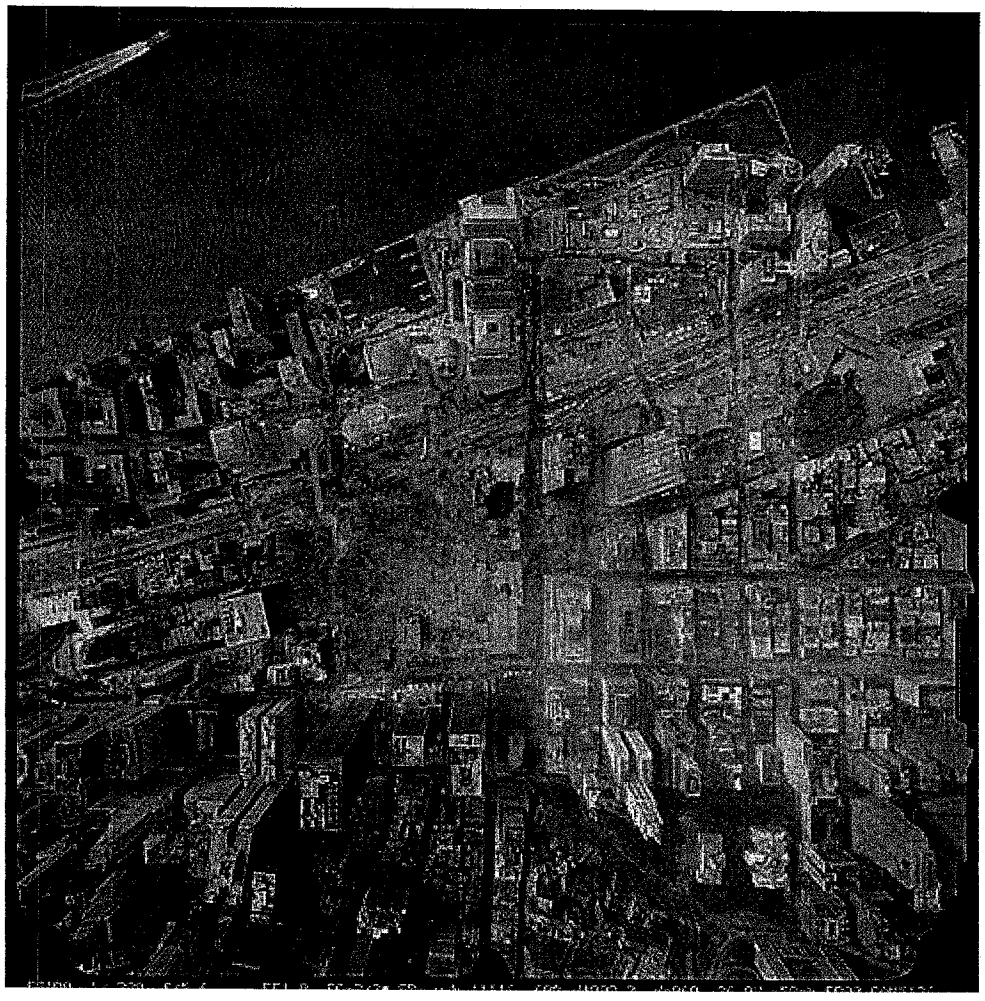



AP PHOTO



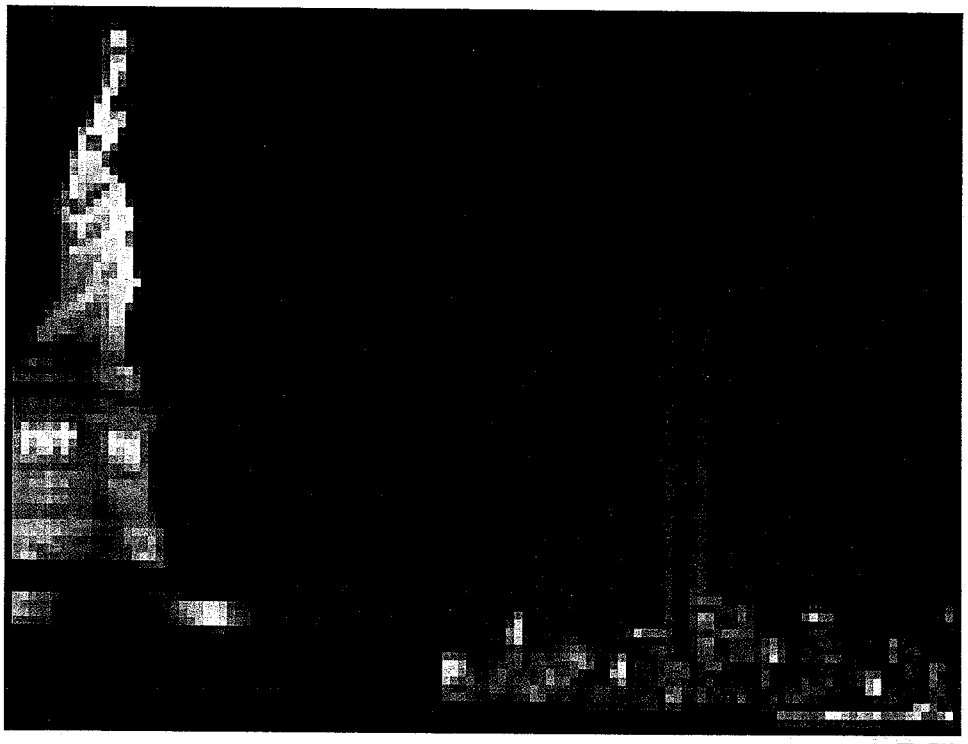


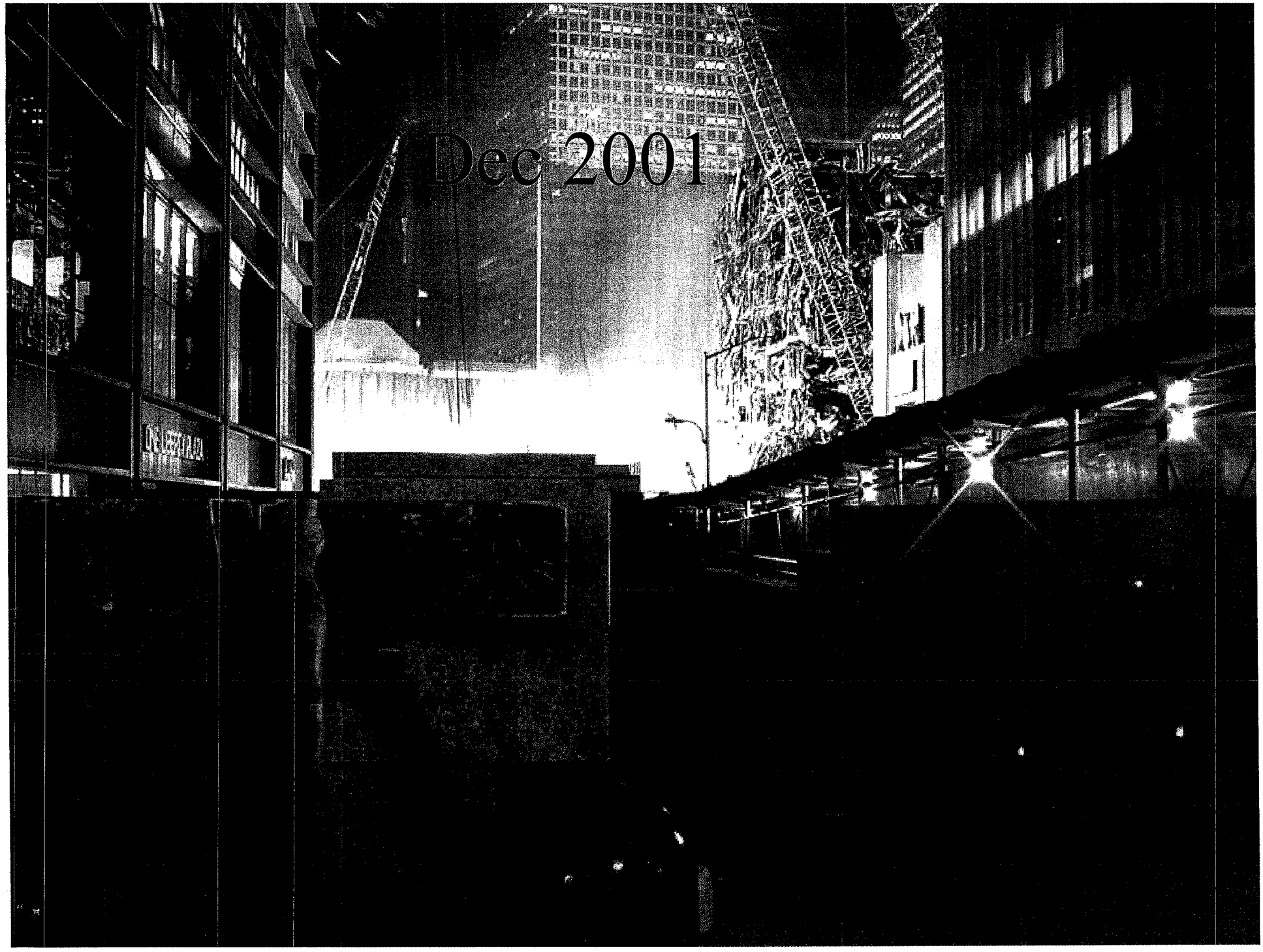
October 18, 2001



Mar 11, 2002

Mar 12, 2002

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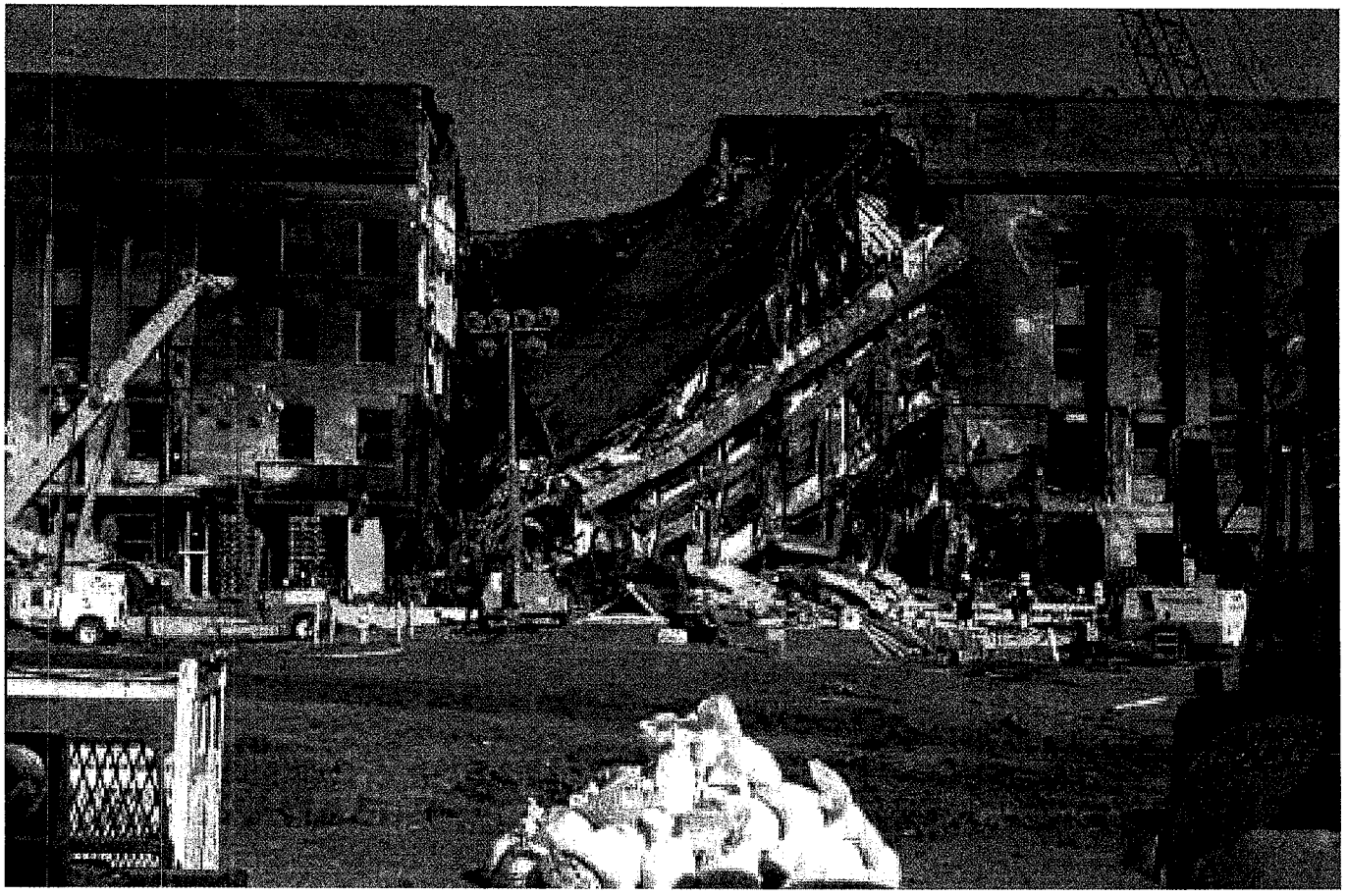
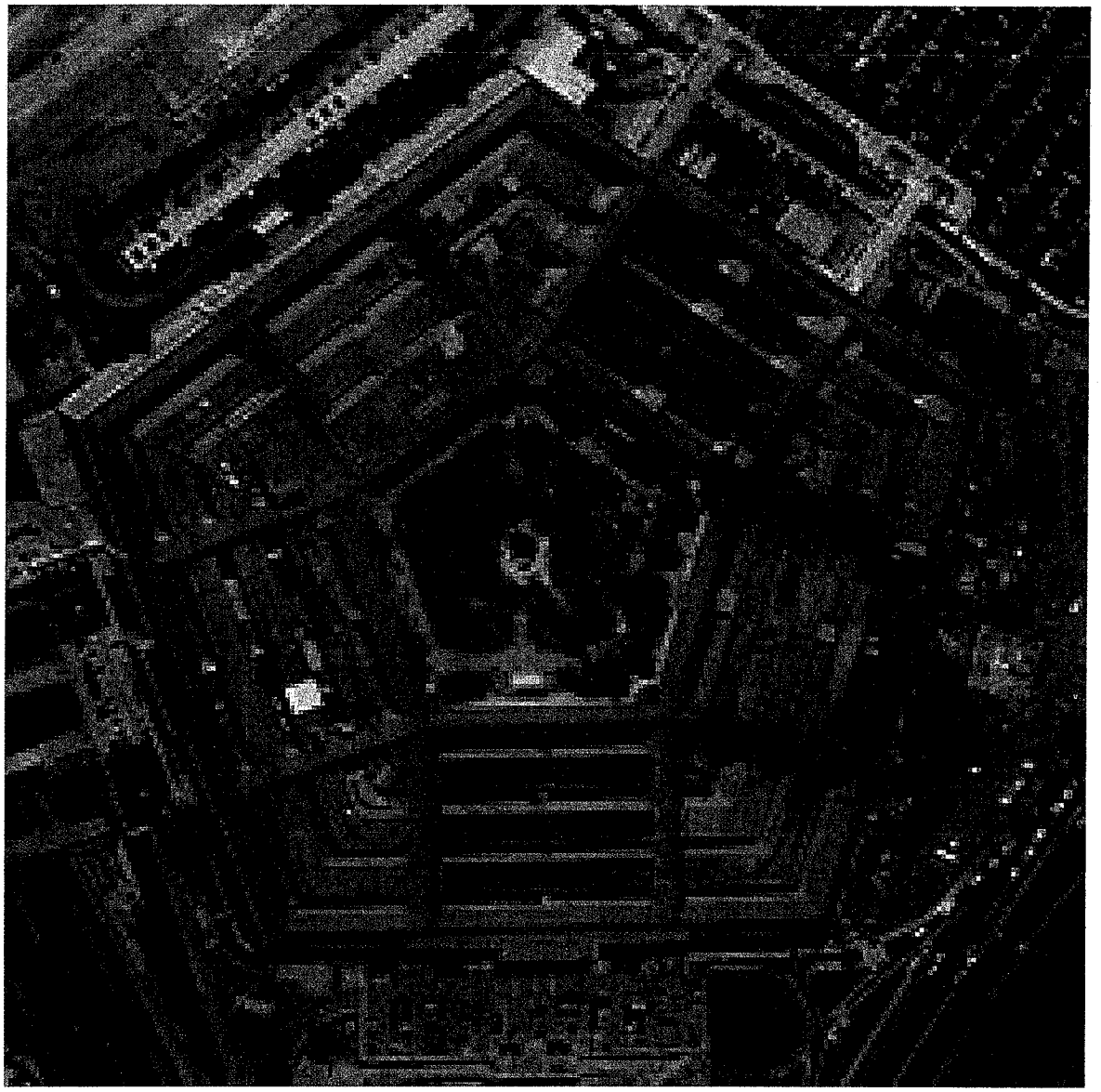
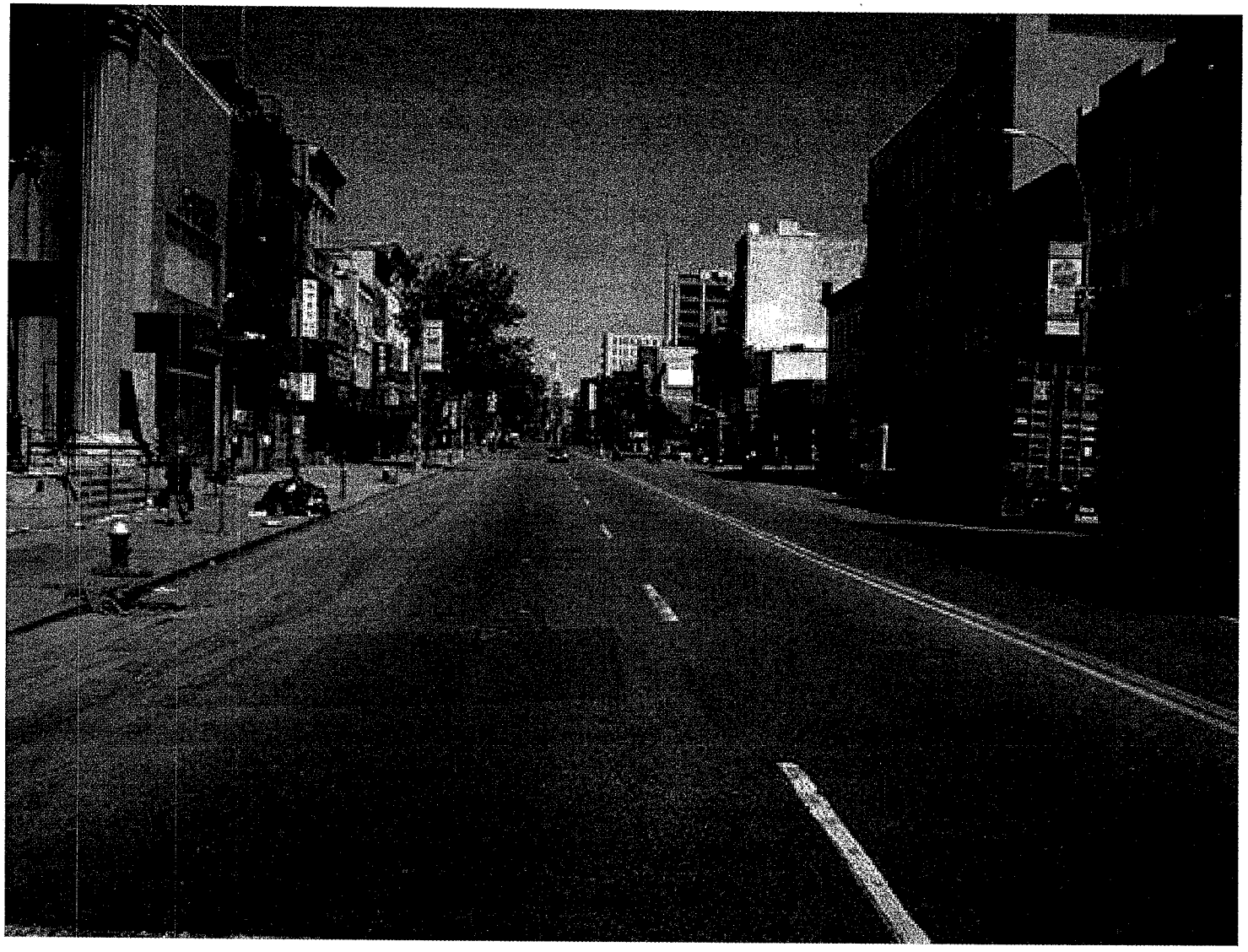
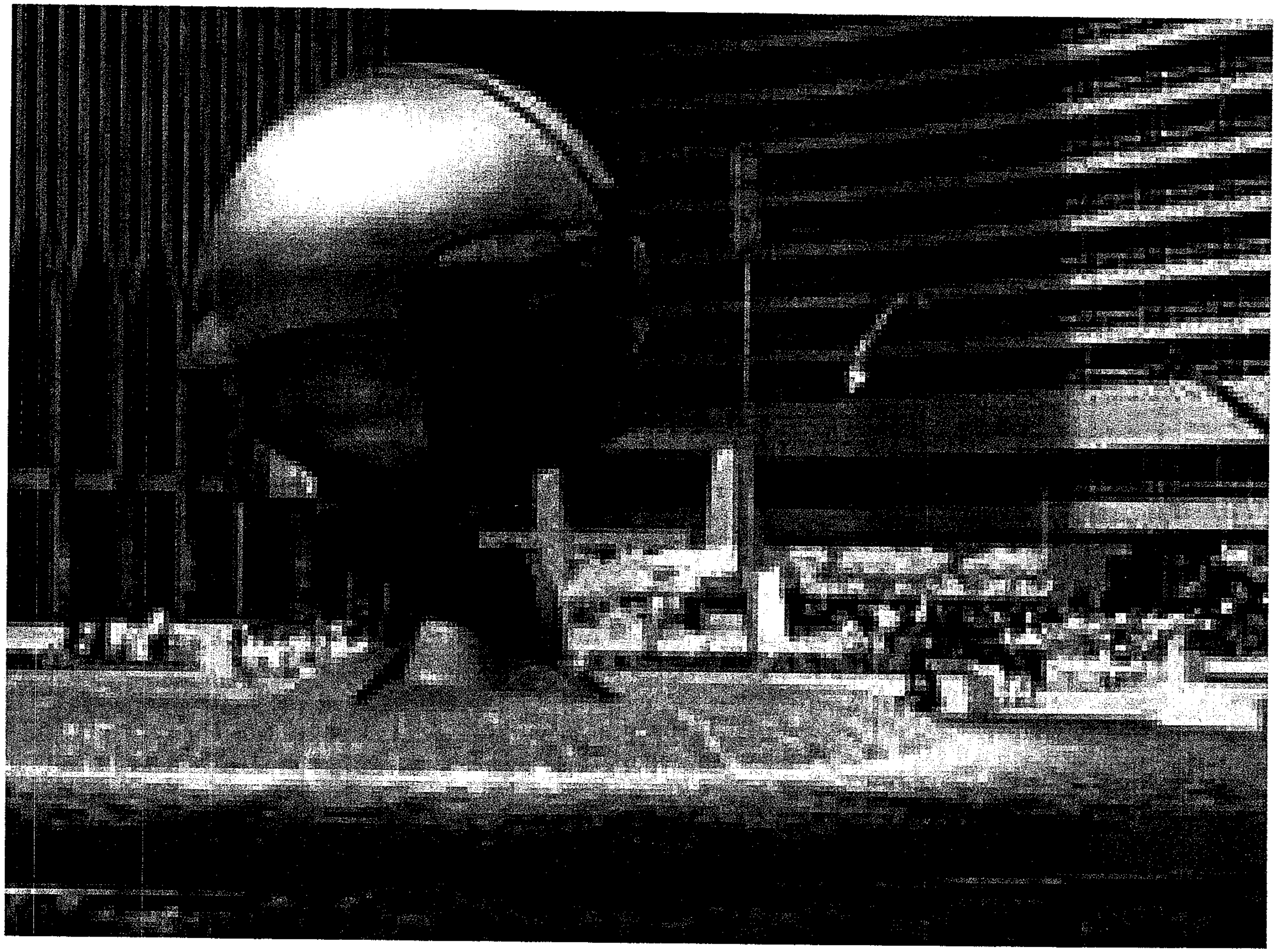




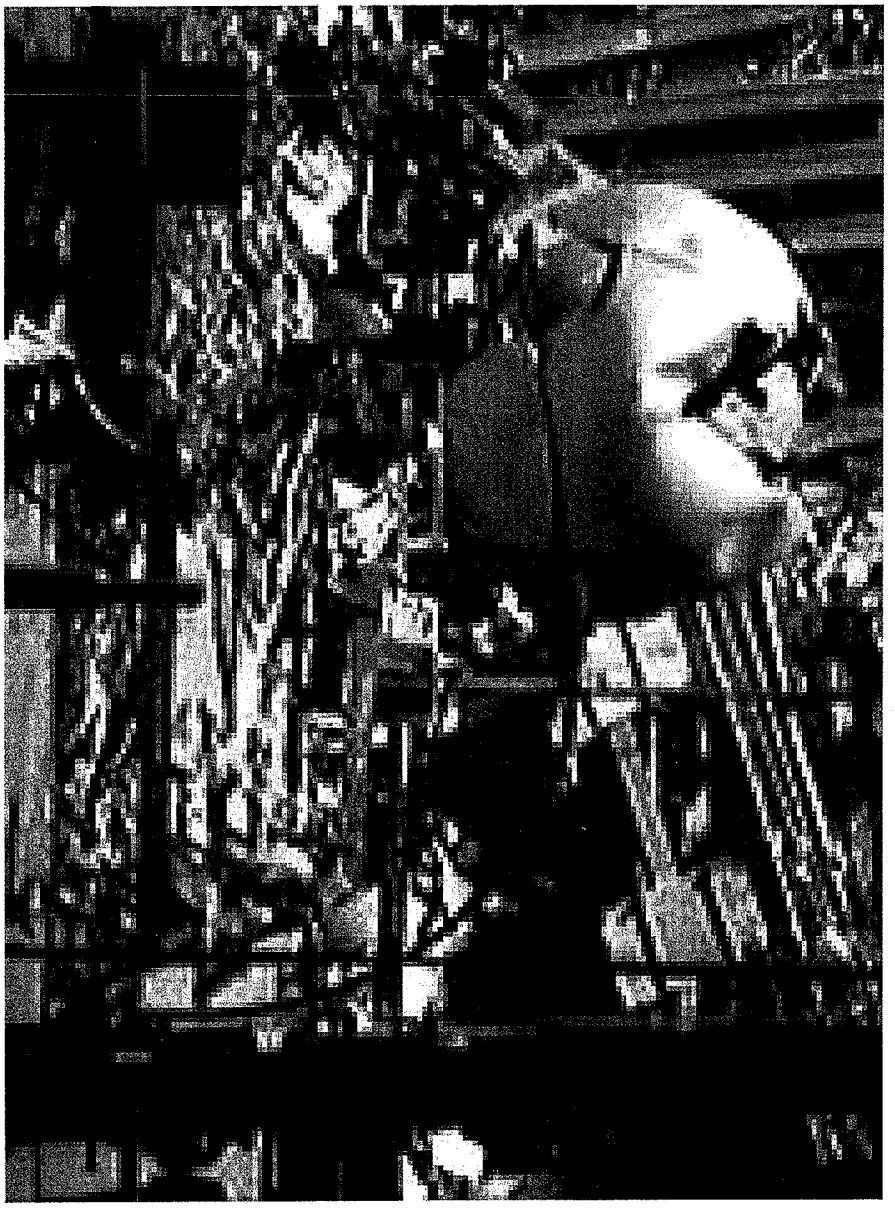
BIG BAY FOOD



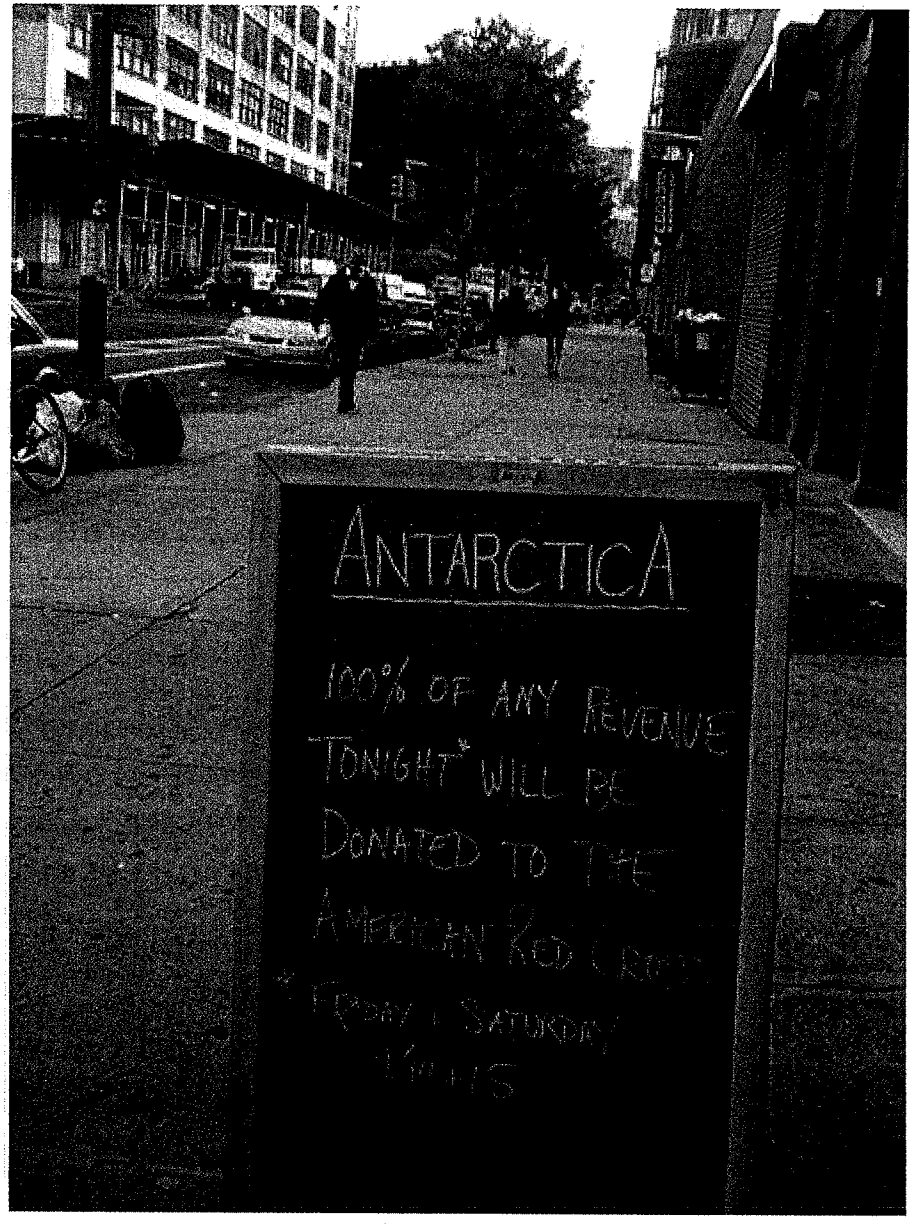


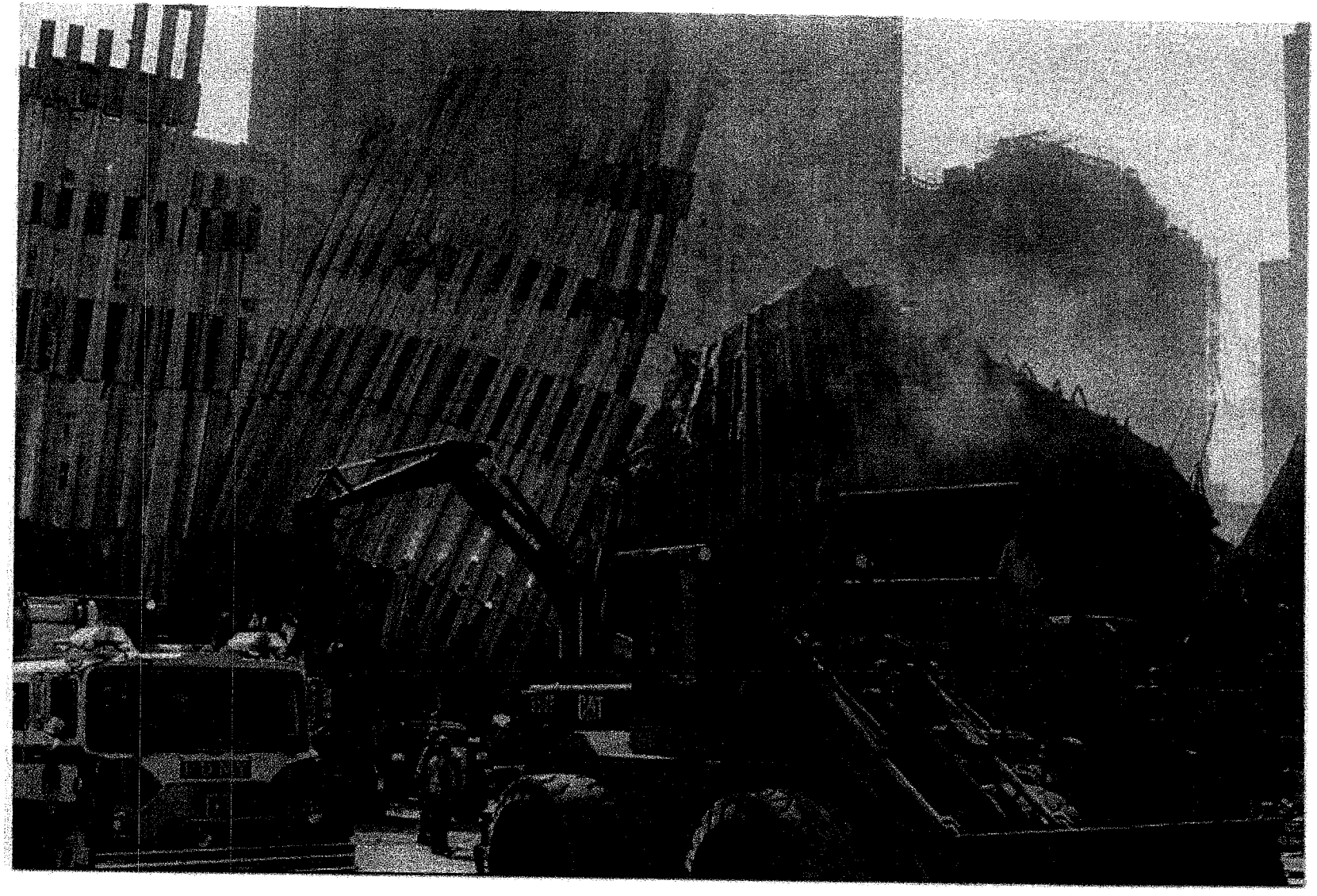
JONES

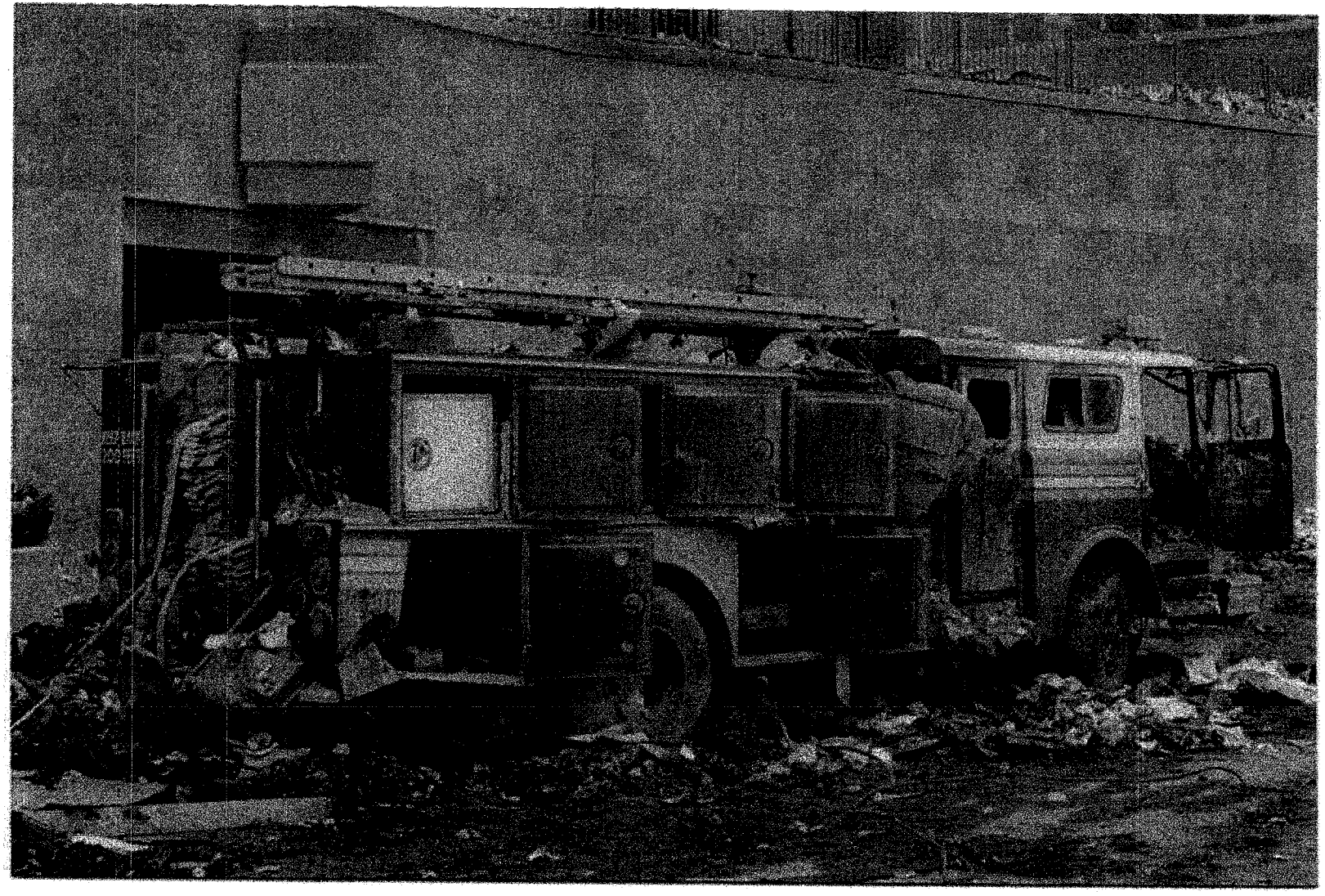

God Bless America
God Bless America
God Bless America
God Bless America
In Honor of
American Pilots

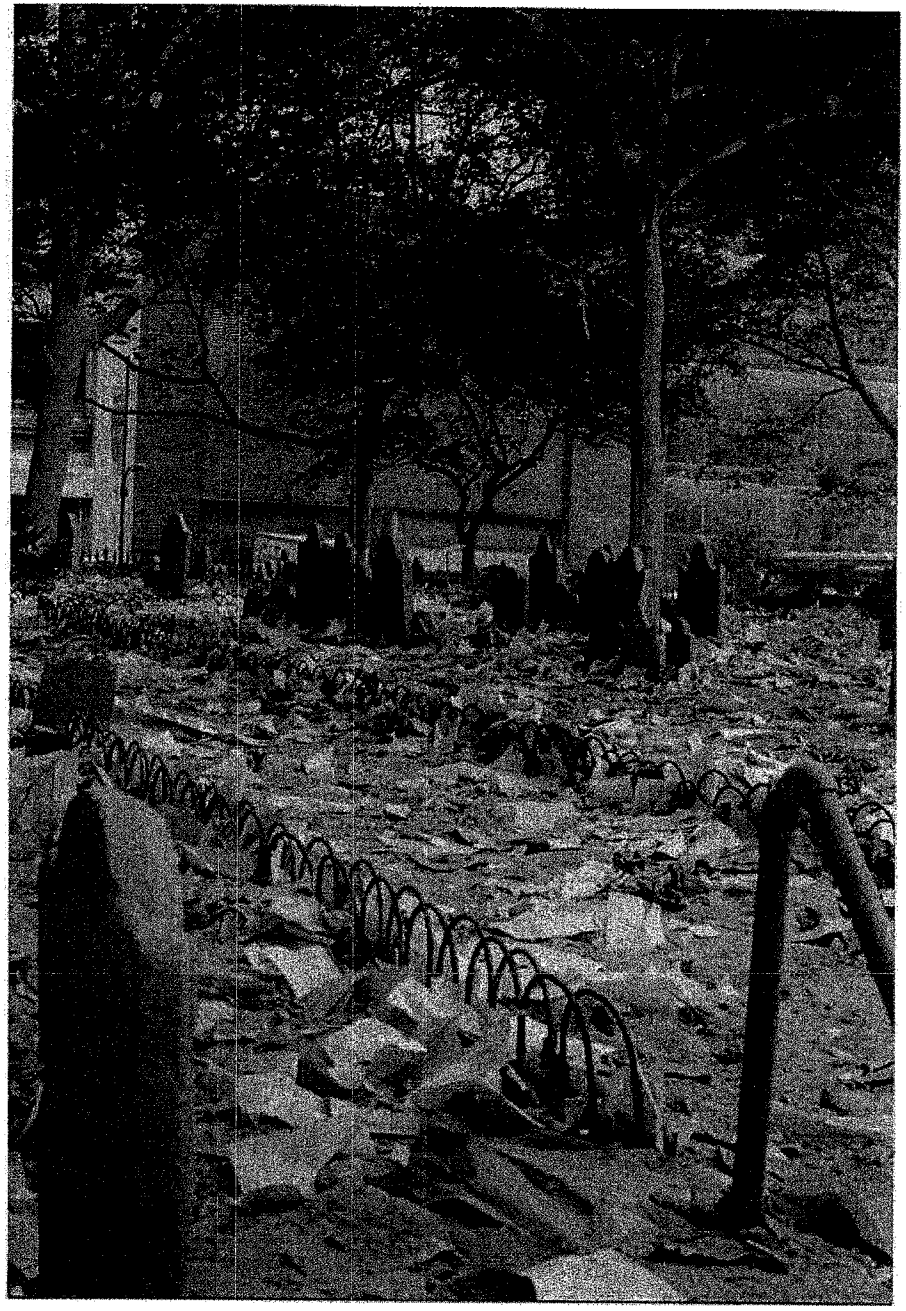


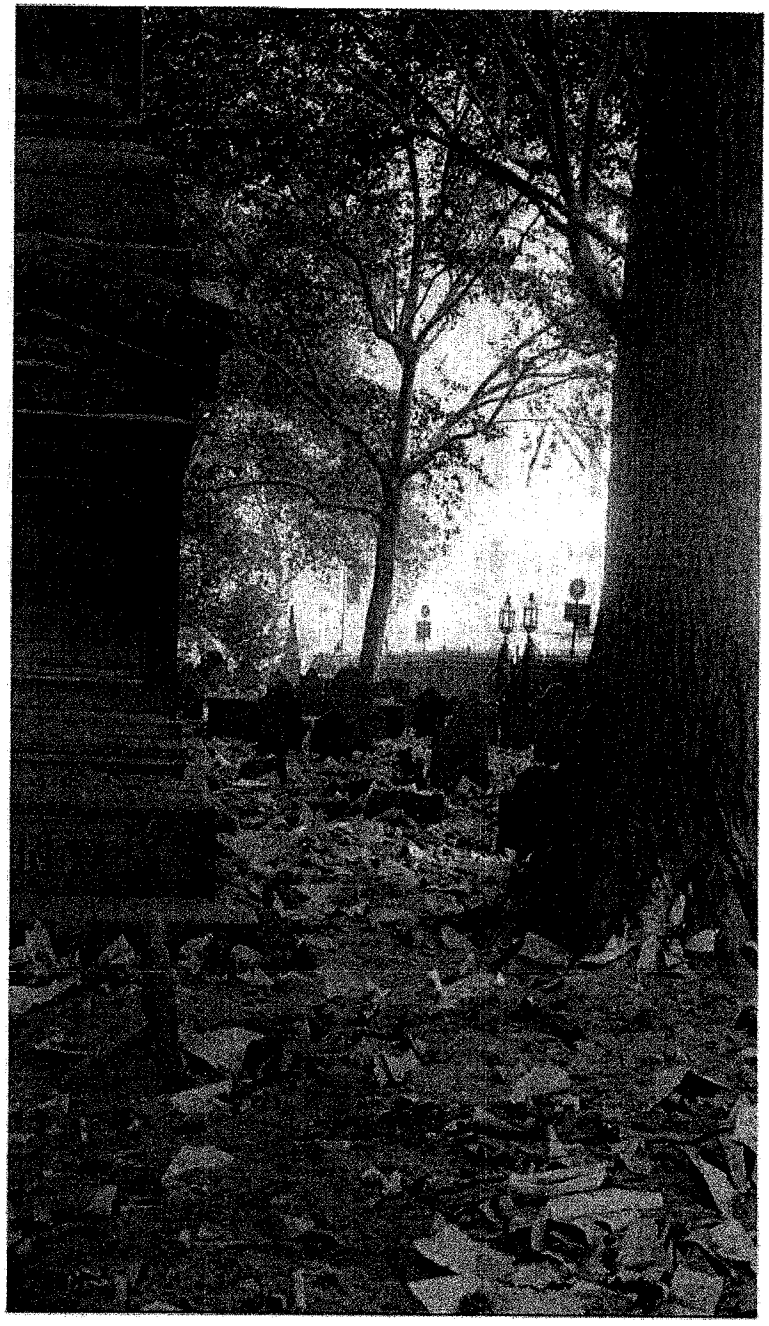

SEPTEMBER

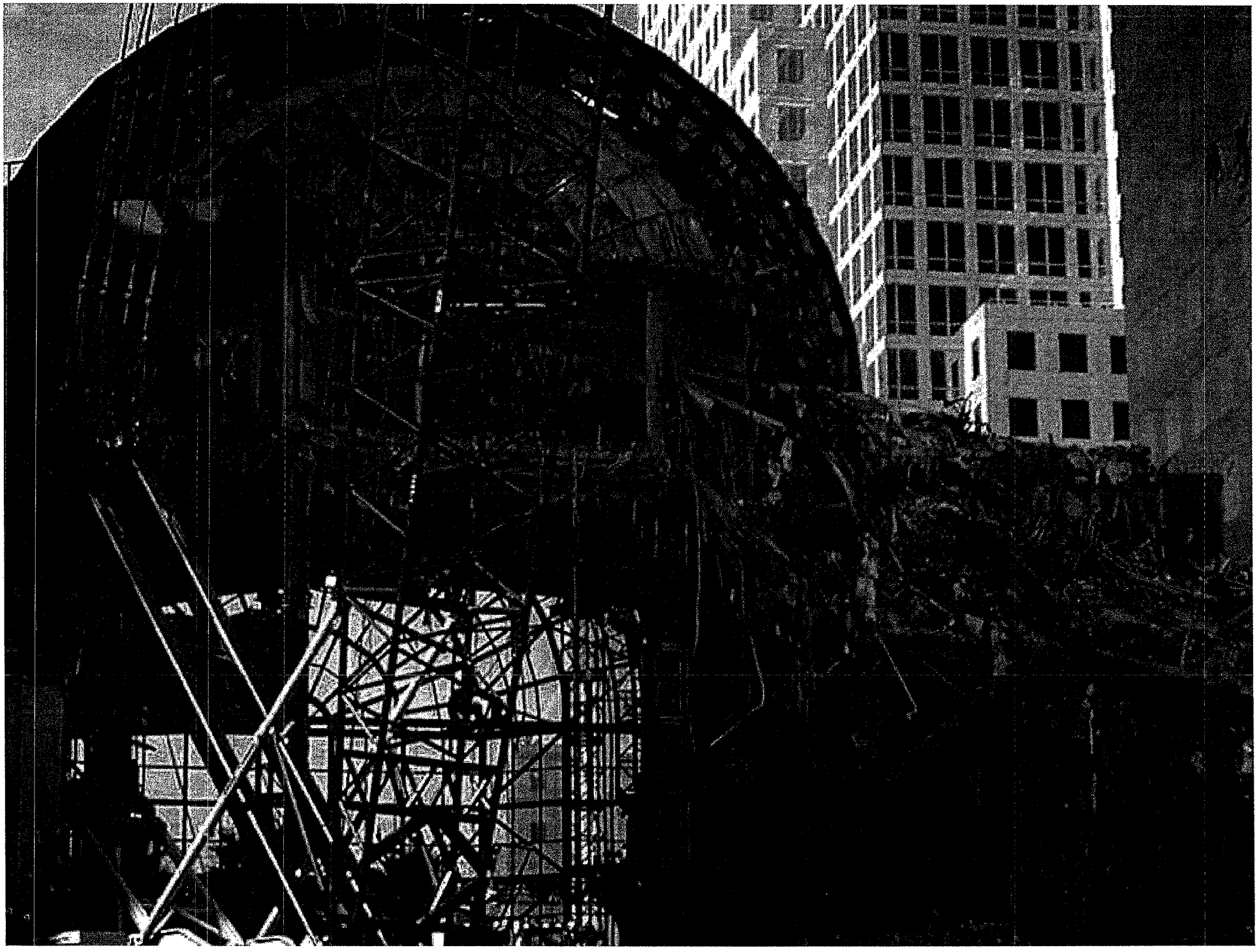

ANTARCTICA
100% OF ANY REVENUE
TONIGHT* WILL BE
DONATED TO THE
AMERICAN RED CROSS

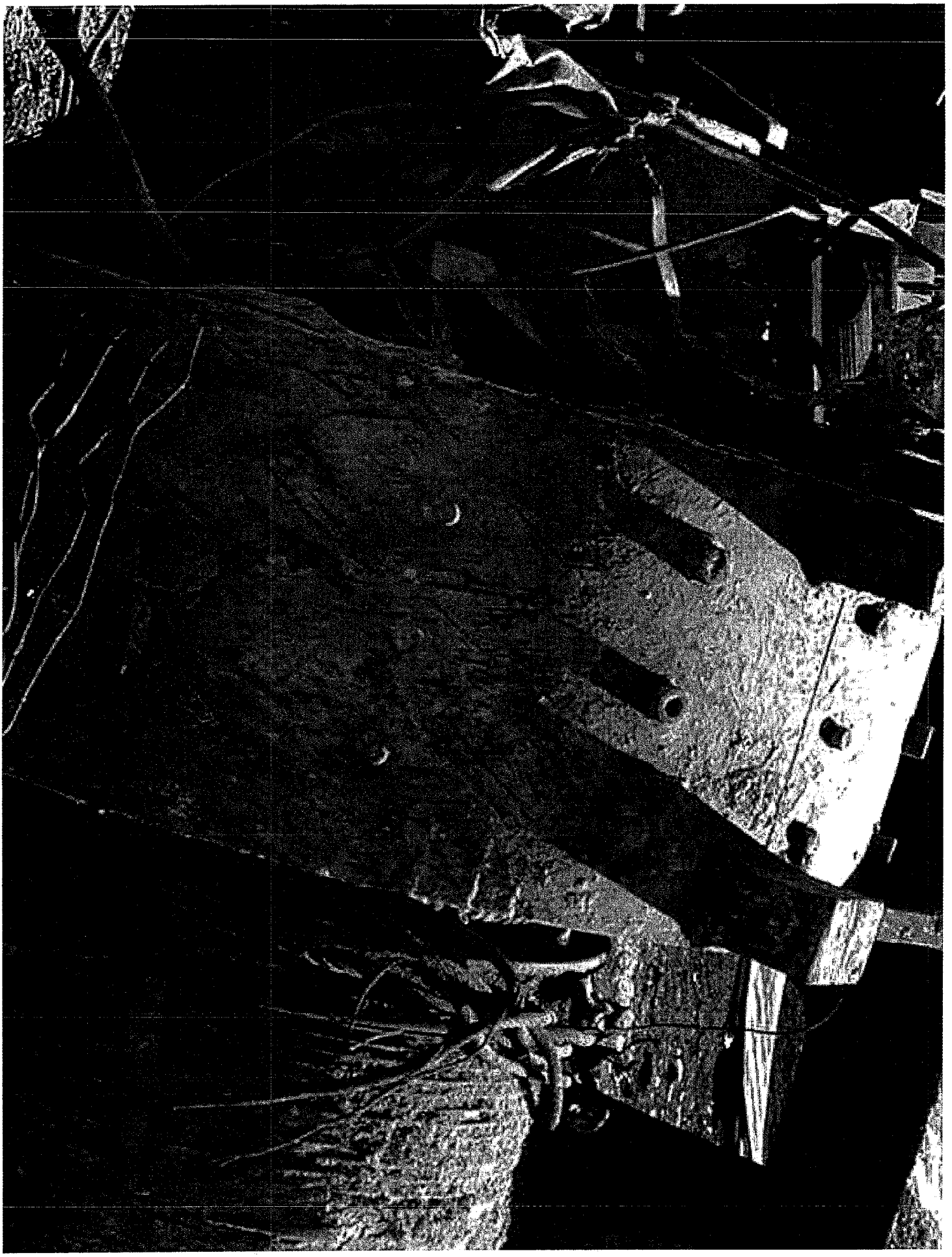












STOP

CHAPTER 2 - EXECUTION

A. DECLARATION OF A DISASTER

In the event of a Disaster which requires a declaration to Comdisco, only designated authorized staff may declare a Disaster. The Authorized Staff are members of the Disaster Recovery Steering Committee and are fully cognizant of their responsibilities. A Disaster, however, which affects the World Trade Center facility, may be declared by Port Authority, the General Manager and / or the Disaster Recovery Steering Committee depending upon the given situation. A declaration could be typically made on one of the following cases, but not necessarily limited to these:

1. A World Trade Center Disaster made be declared if the facility is rendered inoperable or the Port Authority so advises. The Group Head at the New Jersey Data Center is informed in order to prepare the Data Center.

2. In the case that the New Jersey Data Center has a Disaster, the General Manager is informed and the Disaster Recovery Steering Committee is convened. After assessing the situation, authorized staff will notify Comdisco and declare a Disaster.

3. A Disaster may also be declared due to technological failures, weather, and civil unrest or for any reason which renders the normal business operations inoperable.

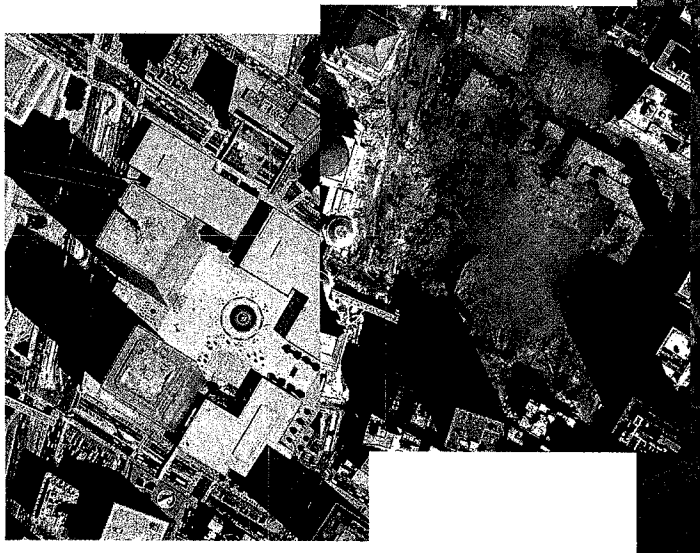
4. Assessment of the Disaster levels will be made by the joint efforts of the Disaster Recovery Steering Committee. The judgment will be based upon the following factors:
   - The effects to the physical environment to the building.
   - Information from building security, Police / Fire
   - Effects on the normal business environment and the ability to continue operations

5. An evacuation will occur according to the procedures on the next page.

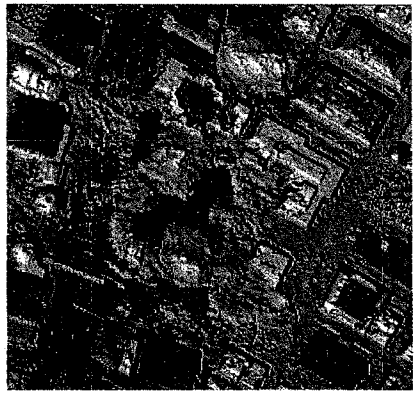
Disaster Response to Lower Manhattan, New York

Stennis Space Center

- Provided technical support to RACNE and coordinated efforts between NY/OFT and Federal Agencies to acquire and distribute data.
- Provided technical support to FEMA on issues raised by response units such as Urban Search and Rescue and FDNY.

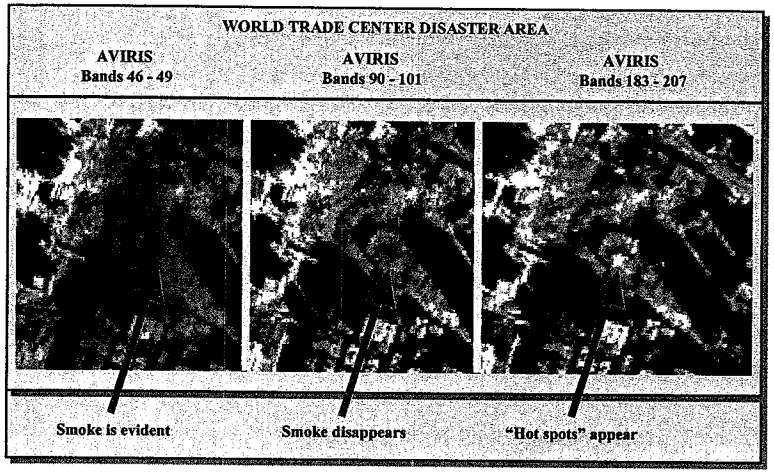


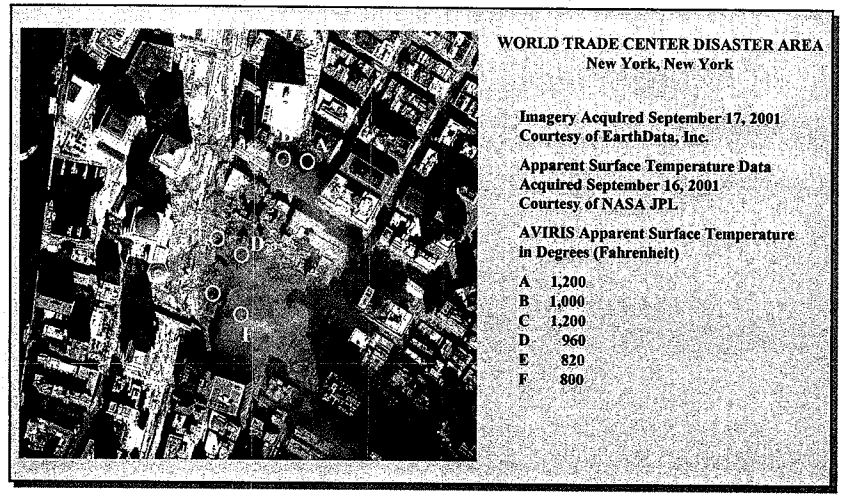
Pan-Sharpened IKONOS Imagery Acquired 9/16/01



Post-Attack Surficial DEM from Airborne Lidar Altimetry Data of 9/17/01

NASA's role in the World Trade Center disaster response efforts, although not broad in scope, still proved distinct and valuable. NASA's unique remote sensing science and engineering capabilities were matched to disaster response data and information needs to provide relevant "on-the-ground" tools for the response workers.





For More Information:

NASA Earth Science Enterprise -- http://www.earth.nasa.gov/
NASA Earth Science Applications Directorate -- http://www.esad.ssc.nasa.gov/
NASA Jet Propulsion Laboratory -- http://www.jpl.nasa.gov/
NASA AVIRIS Home Page -- http://makalu.jpl.nasa.gov/aviris.html

NASA's EARTH SCIENCE ENTERPRISE ASSISTS IN THE SEPTEMBER 11, 2001 WORLD TRADE CENTER DISASTER RESPONSE

NASA's Research & Development Role:

One of NASA's roles as a research and development agency is to make its cutting edge science and technology available to other government agencies, organizations, and individuals who can use the information to make more informed decisions in their daily operations.

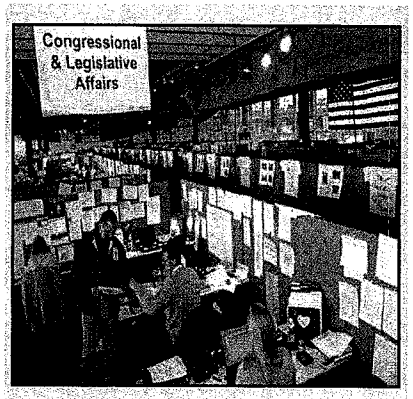
In a disaster scenario, NASA science and technology may be applied to real problems facing disaster managers and emergency response personnel through the Federal Emergency Management Agency's (FEMA) Emergency Support Functions, partnerships with other federal agencies, and through NASA-funded research and technology support to State and local governments.

NASA's Emergency Response:

Shortly after the September 11, 2001 attacks on the World Trade Center, New York State emergency responders contacted the NASA-funded Regional Application Center for the Northeast in Albany, New York and solicited support from NASA's Earth Science Enterprise.

Could NASA's extensive Earth science remote sensing research and technology arsenal help emergency responders at this disaster scene?

NASA's approach was to first understand the particular problems and information needs of the emergency responders.



New York, NY – Disaster Field Office staff work with other agencies operating near Ground Zero. Photo by Andrea Booher/FEMA

New York, NY – FEMA Urban Search and Rescue teams coordinate recovery operations at the World Trade Center site. Photo by Andrea Booher/FEMA

Secondly, NASA would help determine if needs could be met using existing public or private resources.

If not, NASA would work with response personnel to determine unmet needs and develop a technical solution that could address the problems.

NASA's goal was to develop critical information products generated from advanced remote sensing data, and deliver these products to FEMA's first responders.

To achieve this end, NASA's Earth Science Enterprise first committed technical expertise.

Dr. Bruce Davis was dispatched from NASA's Stennis Space Center to apply his scientific expertise in remote sensing to the recovery effort.

Through NASA's relationship with FEMA, Dr. Davis listened to issues raised by the emergency response units and he began to understand their data and information needs.

Once at the disaster site, Dr. Davis provided technical support by translating the information needs into remote sensing missions that addressed specific questions.

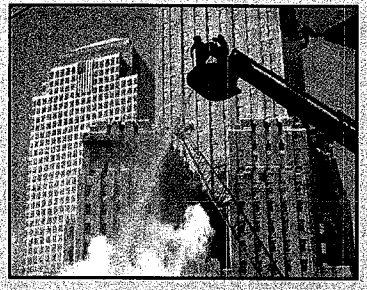
He worked with members of the disaster response team and with other scientists within NASA to secure the right technology to help solve the problems.

New York, NY – New York firefighters and urban rescue workers sift through the rubble of the World Trade Center. Photo by Michael Rieger/FEMA

Disaster Response Problems & Technological Solutions:

Two problems identified by response personnel were smoke in the photos of the debris pile and the location of "hot spots" at ground zero.

The smoke from burning debris clouded the images and hampered the ability to adequately characterize the nature and extent of damage. Additionally, the smoke released potentially hazardous toxins into the air and posed a serious health threat to emergency responders, nearby citizenry, and the natural environment.

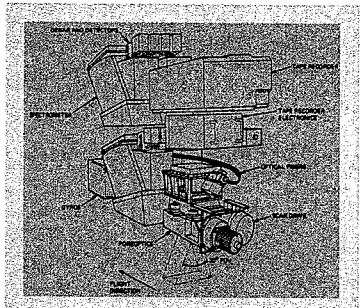


New York, NY – New York City firefighters battle smoldering blazes from a fire truck at the World Trade Center. Photo by Bri Rodriguez/FEMA

New York, NY – New York Fire Department Battalion 44 continues to put out smoldering fires at Ground Zero. Photo by Andrea Bocher/FEMA

The "hot spots", where intensely burning debris generated temperatures in excess of 1,300 degrees Fahrenheit, posed a significant danger to relief workers. NASA had an instrument that could provide information that would be useful to emergency responders. NASA's Airborne Visible Infrared Imaging Spectrometer (AVIRIS) science instrument was capable of providing data that could be used to filter smoke and locate extreme hot spots.

This unique optical sensor instrument was developed at NASA's Jet Propulsion Laboratory. NASA chartered a Twin Otter airplane to carry the AVIRIS instrument to acquire images at low altitudes. Low altitude data collections result in higher resolution images of features at the disaster site.



The AVIRIS instrument was developed at NASA's Jet Propulsion Laboratory.

In the New York City recovery mission, NASA's AVIRIS instrument was mounted to a Twin Otter airplane and flown over the World Trade Center site.

The AVIRIS sensor is capable of "seeing" objects throughout a large portion of the electromagnetic spectrum. It can record reflected light similar to the human eye but also "see" into the infrared region as well.

Each distinct region of the spectrum has a unique frequency and wavelength. The human eye can perceive certain frequencies as either blue, green or red, or some combination of the three. This very small part of the electromagnetic spectrum is called the visible light spectrum. The AVIRIS sensor, with its scanning optics and four spectrometers, can "see" 224 different portions, or bands, of the spectrum. In NASA's Earth science program, AVIRIS is used to identify and measure constituents (chemical elements) of the Earth's surface and atmosphere based on images from different parts of the spectrum.

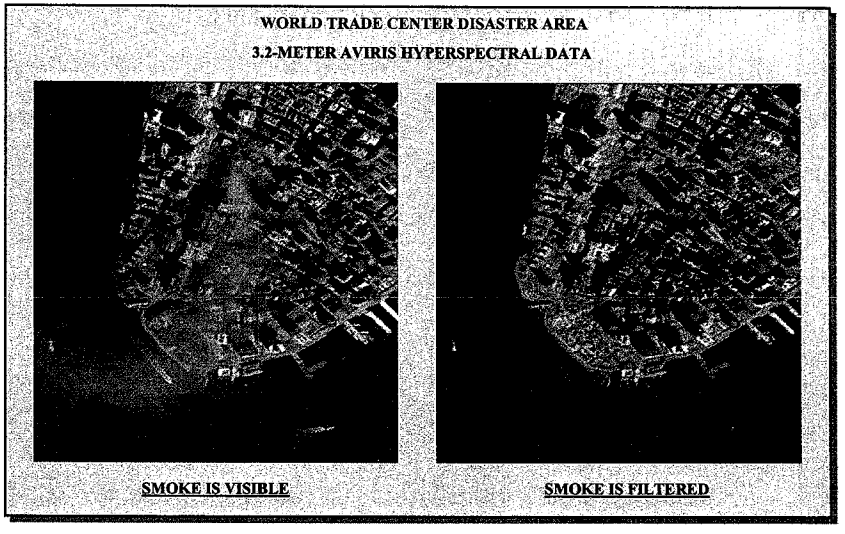
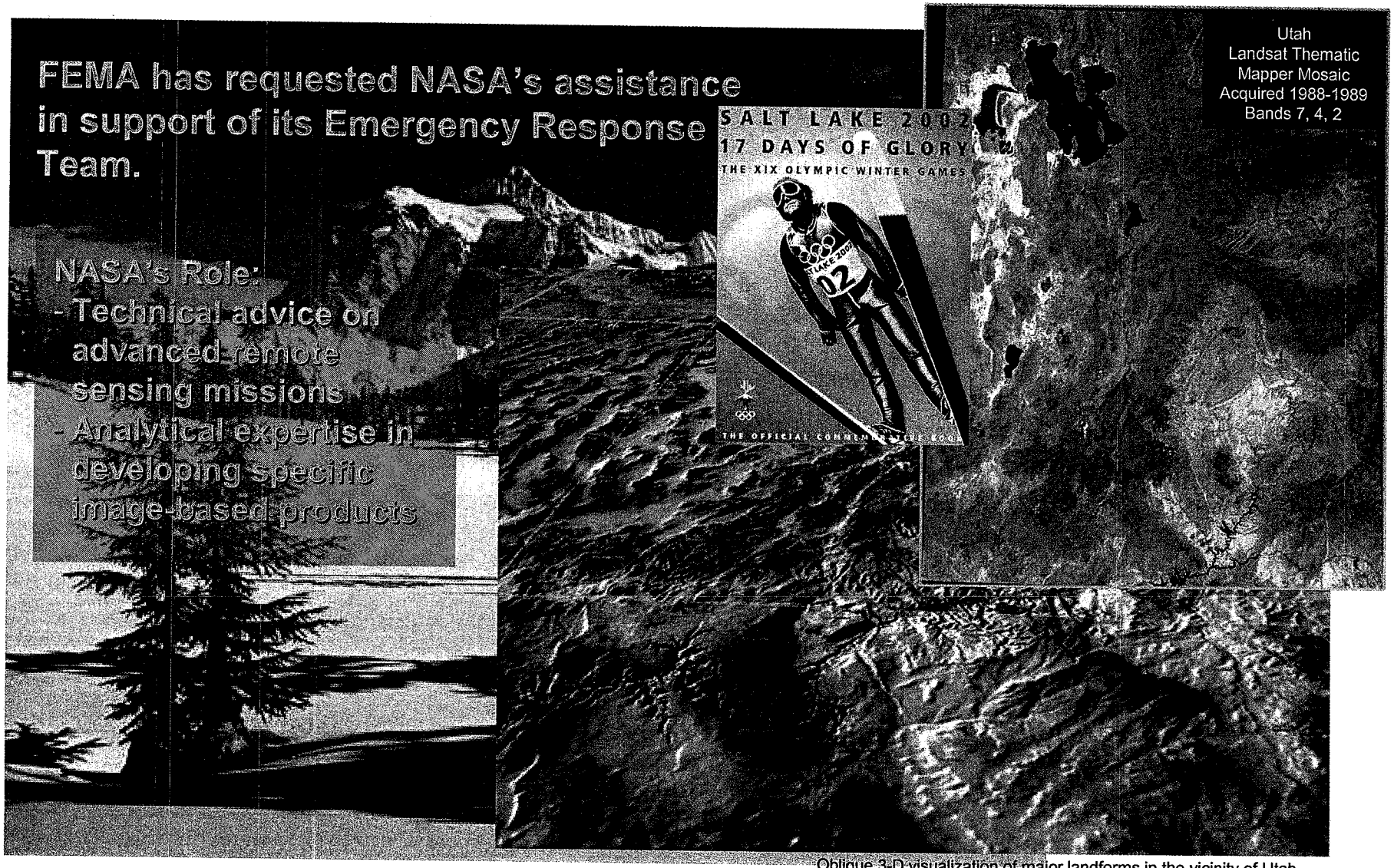


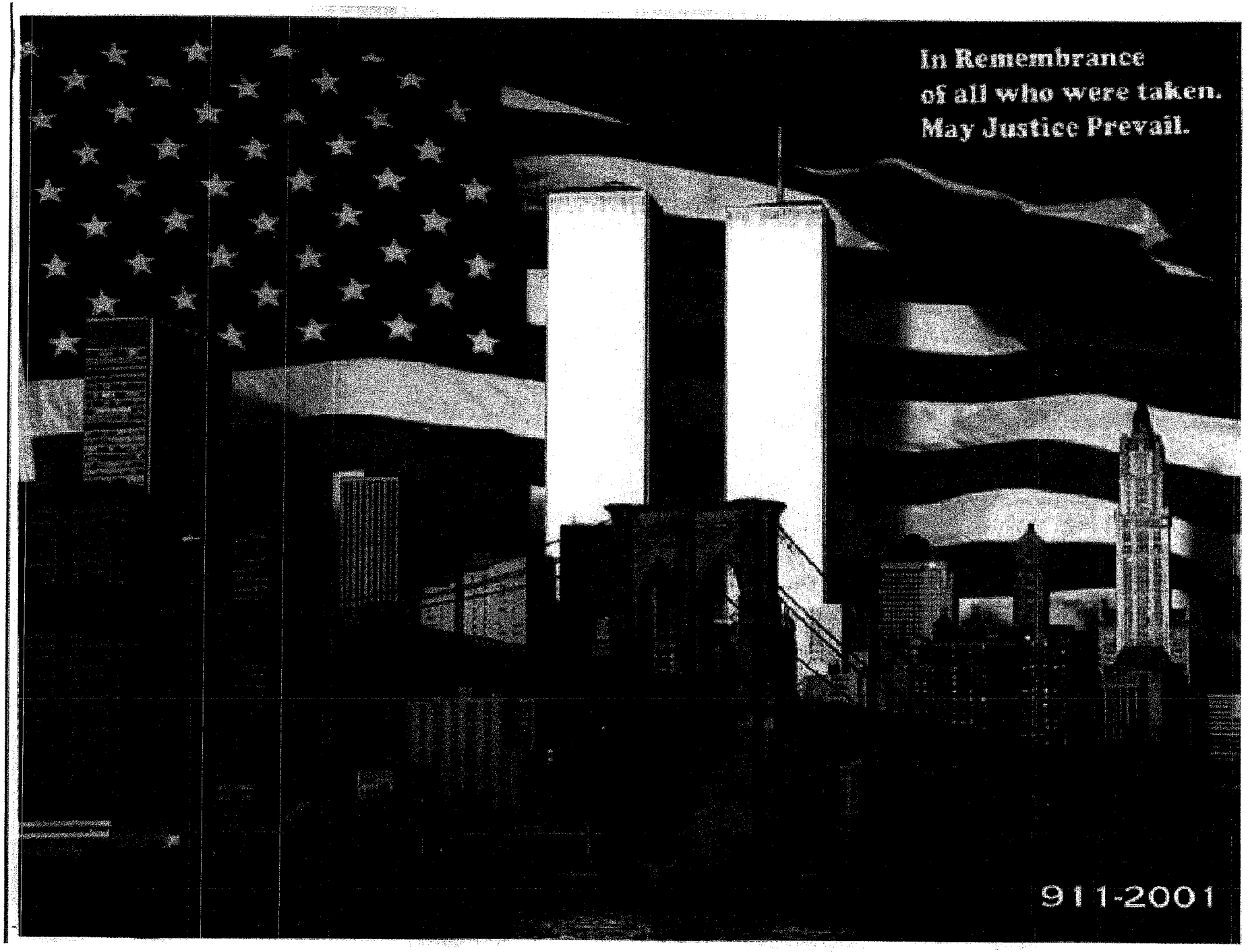
Image data collected by AVIRIS was processed and interpreted by NASA and other Federal agency scientists. By selecting specific spectral bands of AVIRIS imagery, certain features, like smoke, could be removed and other features, like thermal "hot spots," could be emphasized. This information was posted to a secure Web site as a usable map and image product for the response personnel.

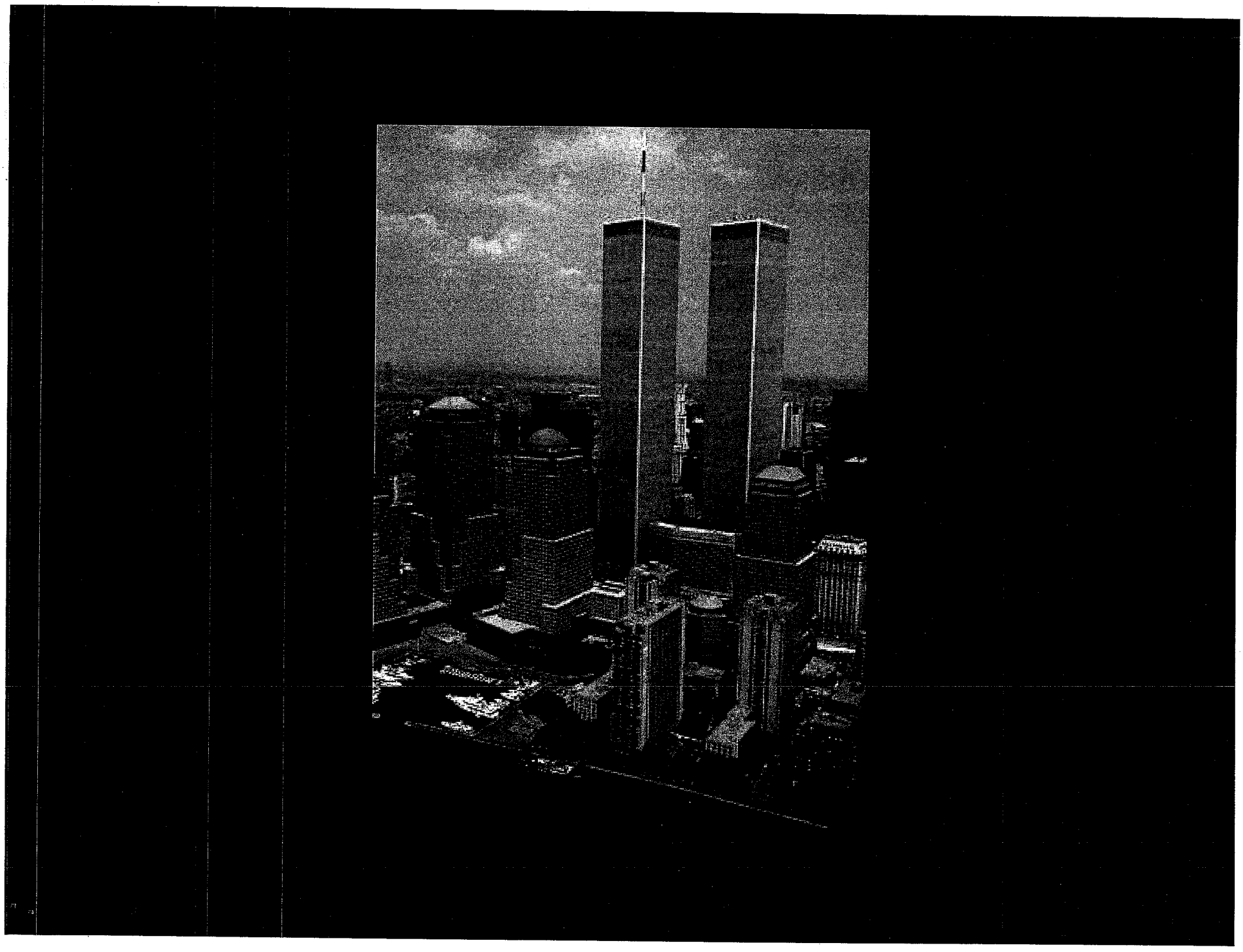
Disaster Management

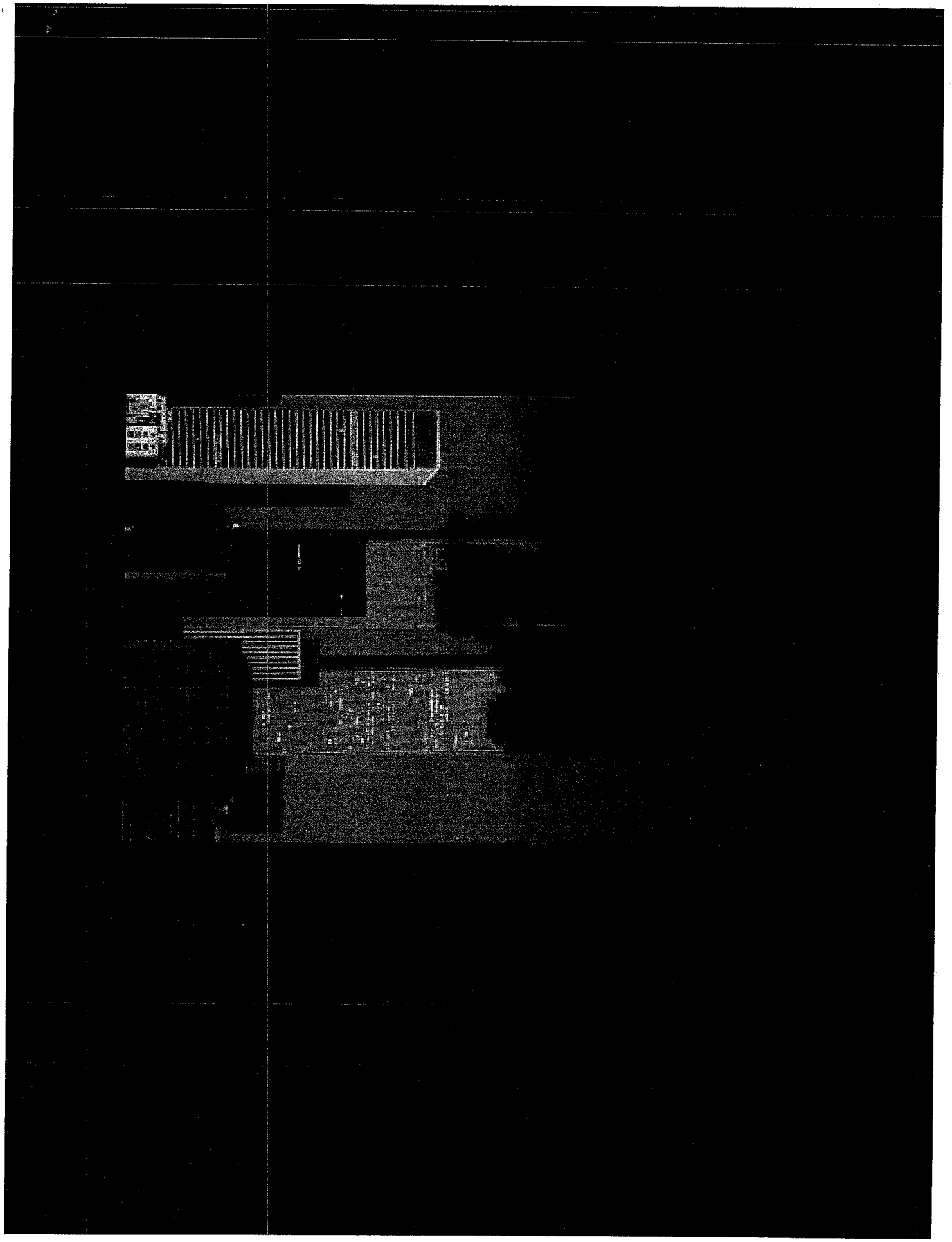
Ensuring the Safety of the Olympic Games

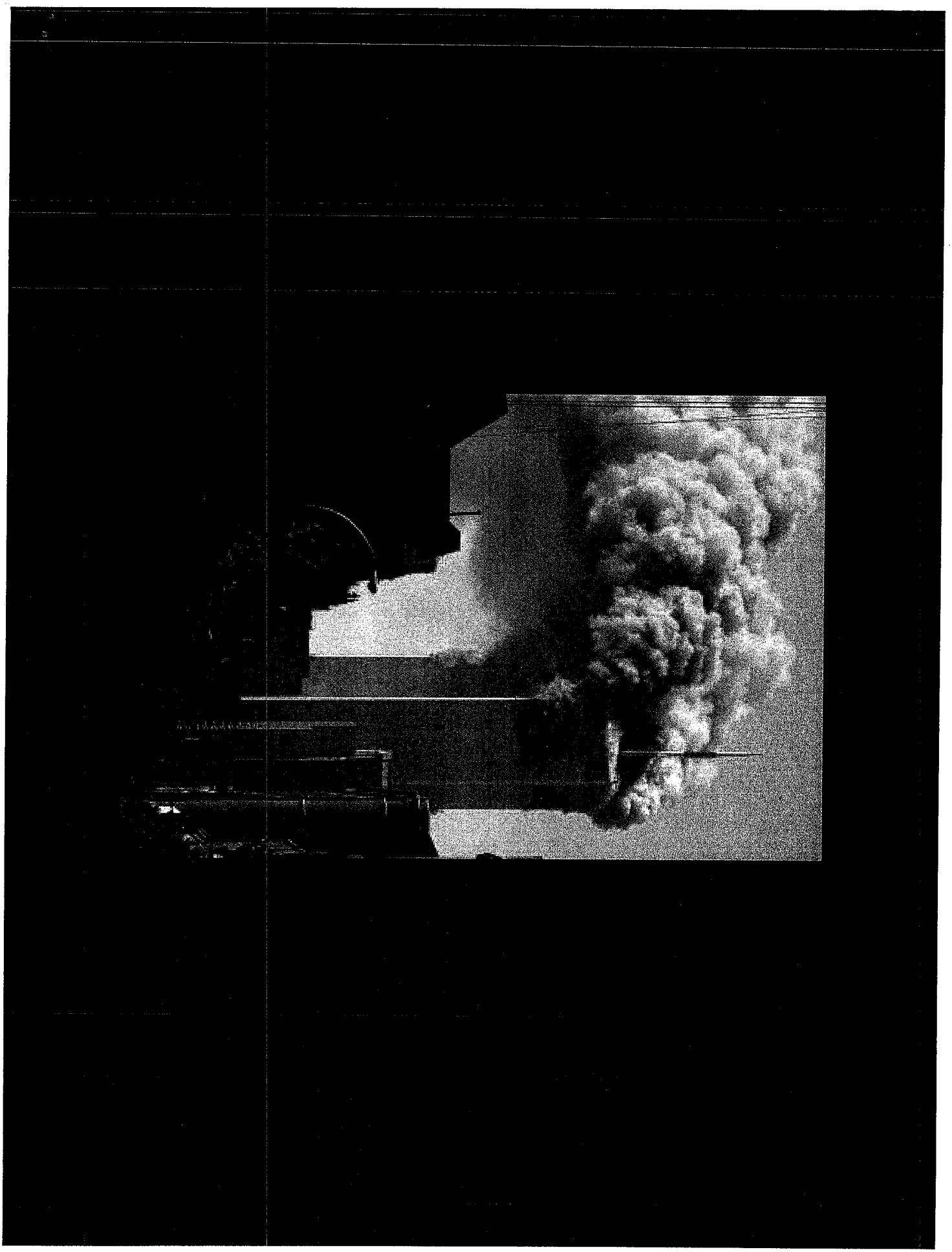


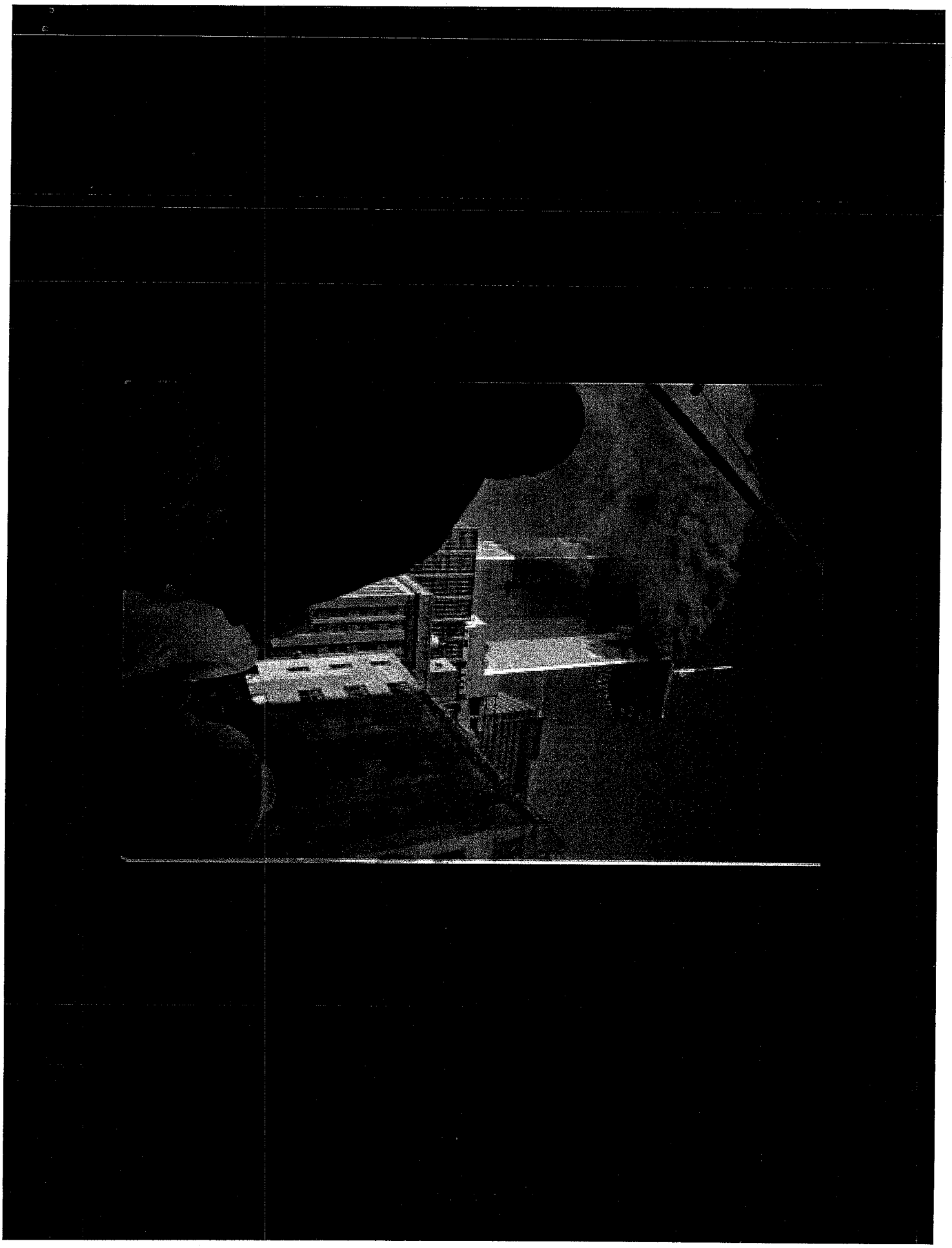
Oblique 3-D visualization of major landforms in the vicinity of Utah using merged AVHRR satellite imagery and USGS DEM data

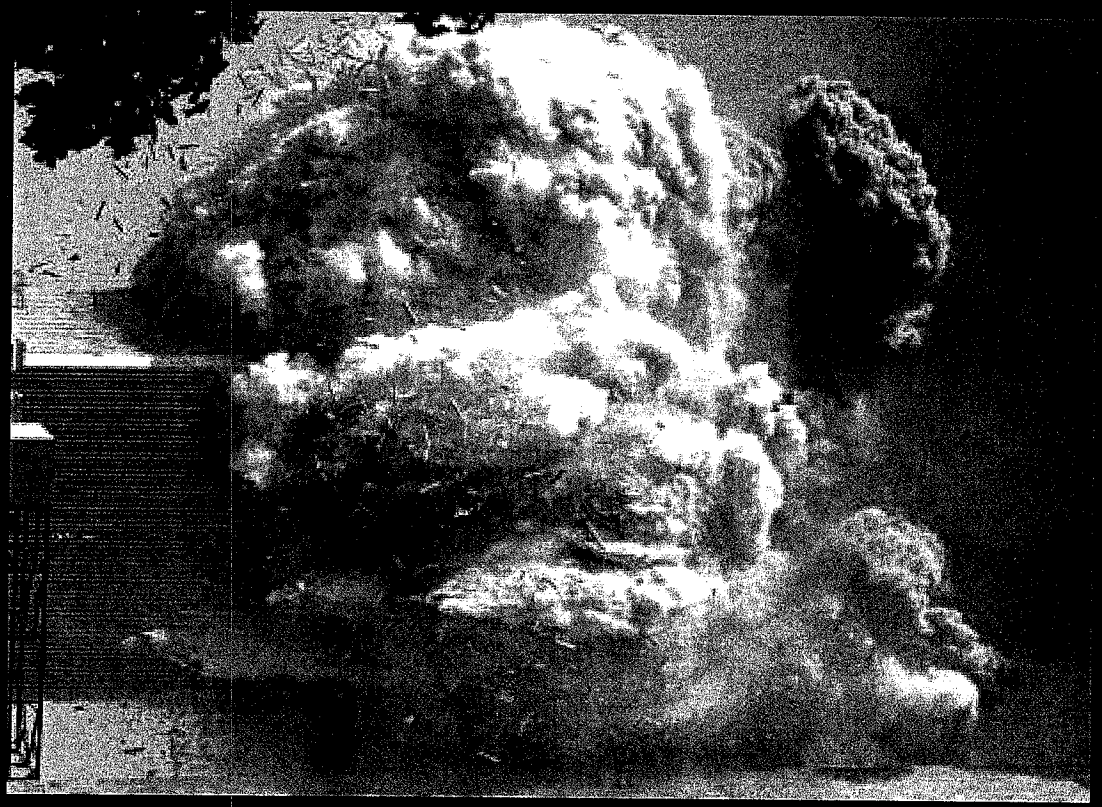

In Remembrance
of all who were taken.
May Justice Prevail.
911-2001

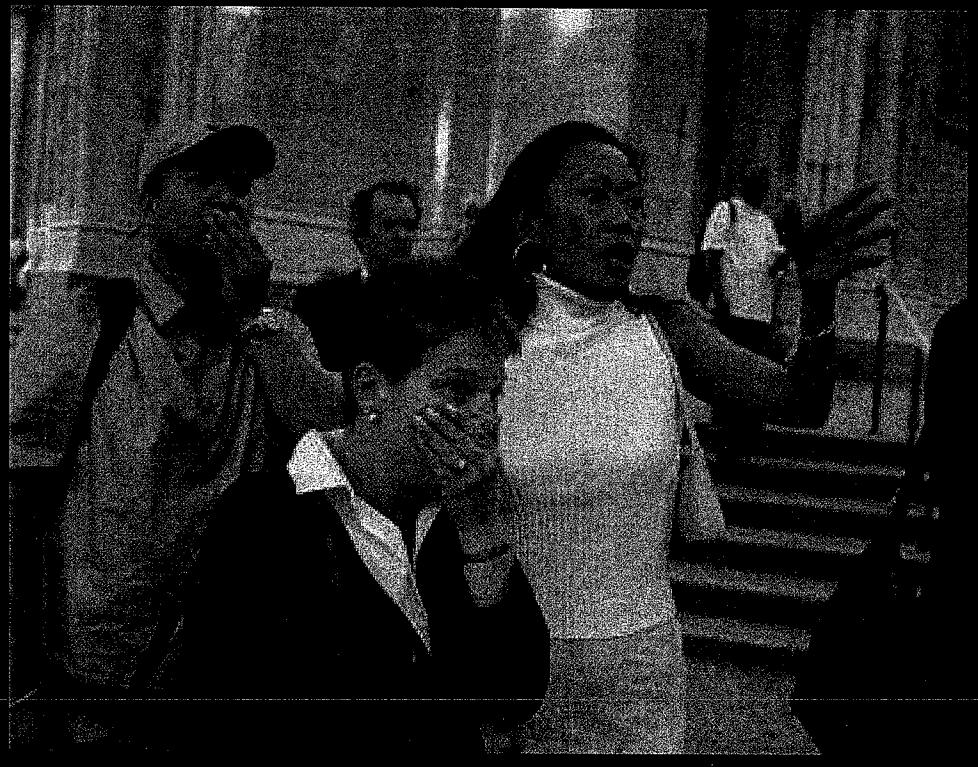




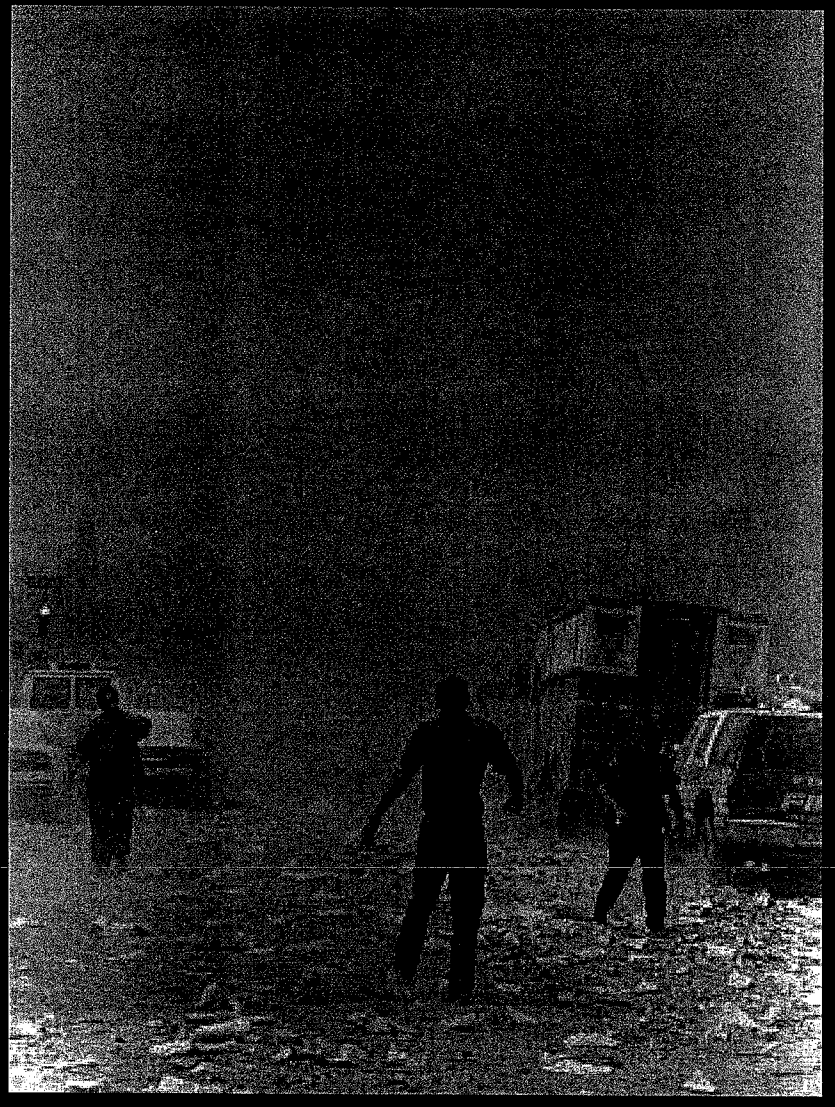


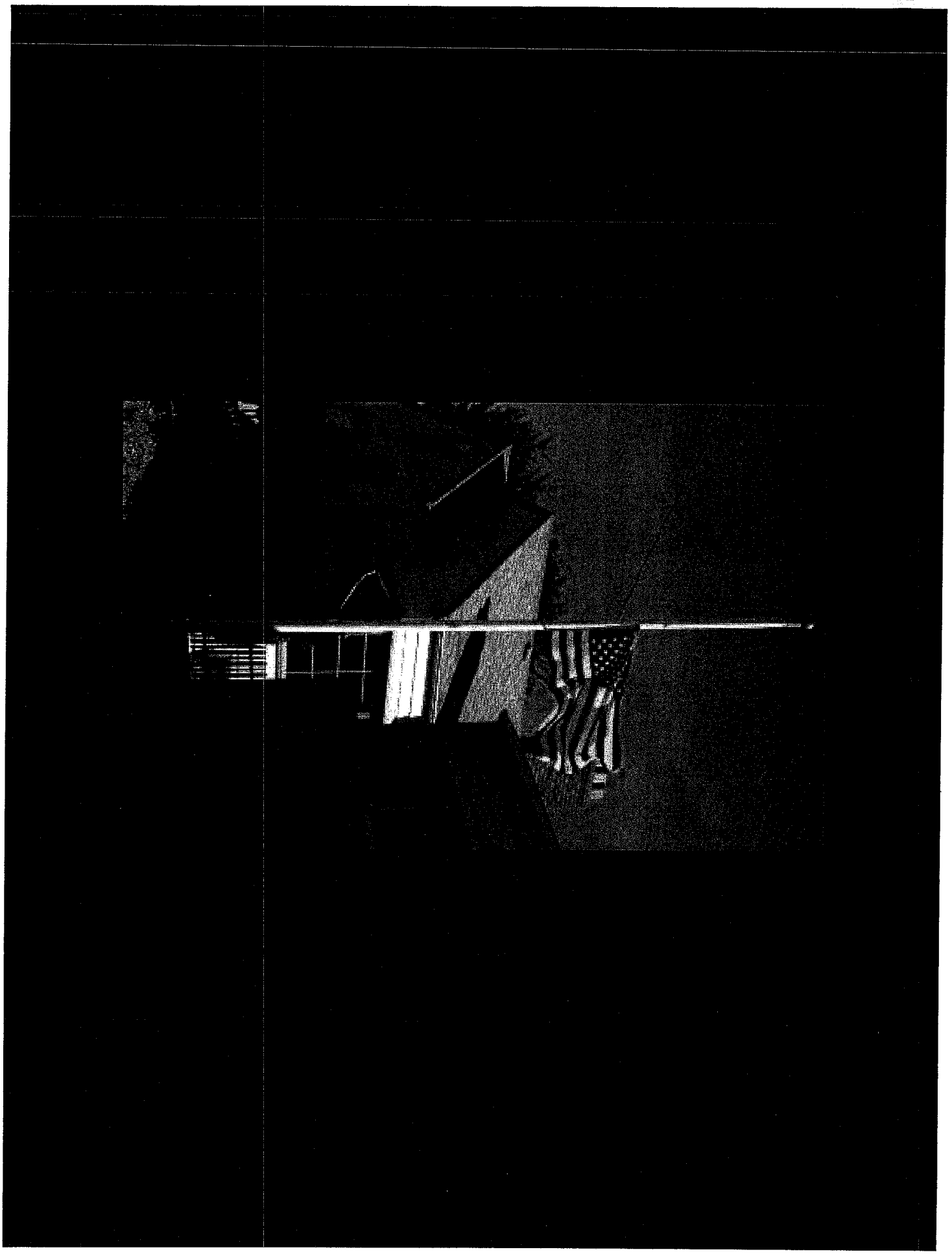






GUIDANCE





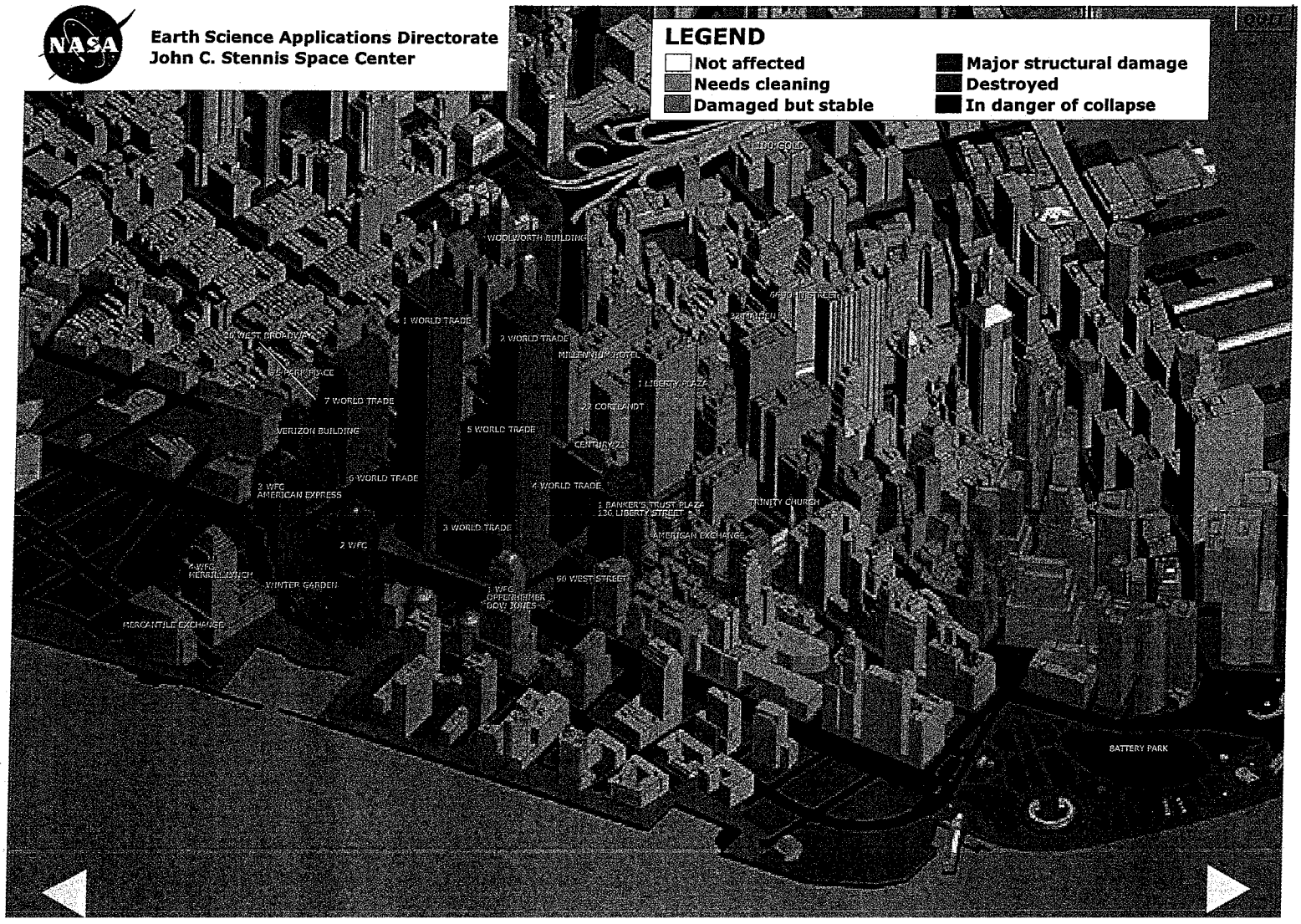
Earth Science Applications Directorate
John C. Stennis Space Center

QUIT

Building Geometry & Image Data for the World Trade Center Area

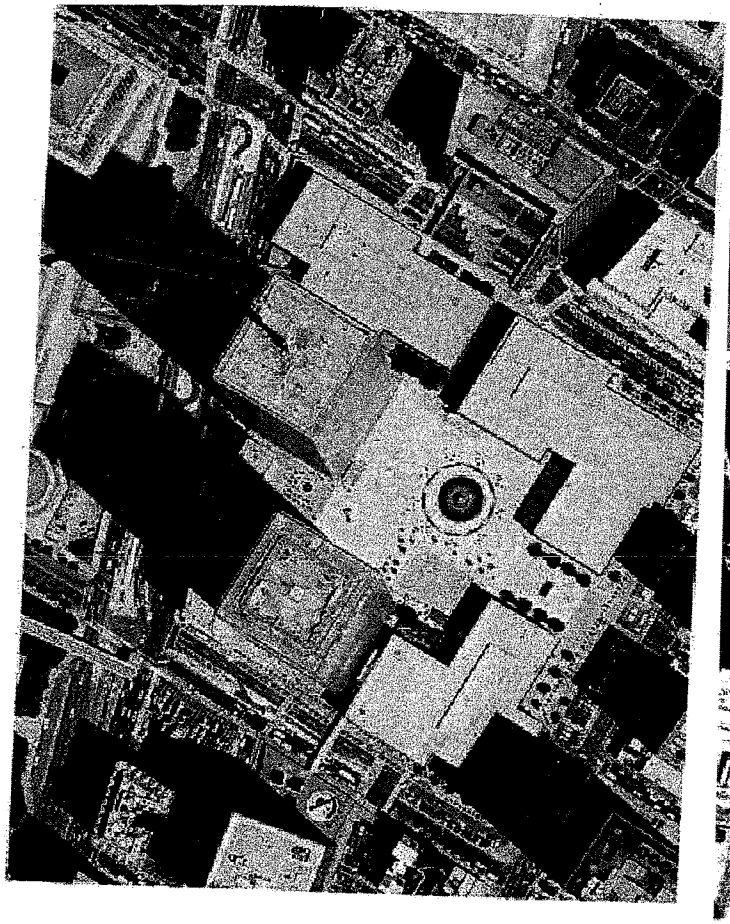
Remote sensing imagery provided by Pictometry
Ground imagery provided by NASA Stennis Space Center

Presentation developed by Stennis Space Center


Earth Science Applications Directorate
John C. Stennis Space Center
LEGEND
Not affected
Needs cleaning
Damaged but stable
Major structural damage
Destroyed
In danger of collapse
100 GOLD
WOOLWORTH BUILDING
1 WORLD TRADE
2 WORLD TRADE
MILLENNIUM HOTEL
1 LIBERTY PLAZA
22 CORTLANDT
7 WORLD TRADE
VERIZON BUILDING
5 WORLD TRADE
CENTURY 21
6 WORLD TRADE
4 WORLD TRADE
3 WFC
AMERICAN EXPRESS
2 BANKER'S TRUST PLAZA
130 LIBERTY STREET
TRINITY CHURCH
3 WORLD TRADE
AMERICAN EXCHANGE
2 WFC
4 WFC
MERRILL LYNCH
WINTER GARDEN
90 WEST STREET
1 WFC
OPPENHEIMER
DOW JONES
MERCANTILE EXCHANGE
BATTERY PARK

Earth Science Applications Directorate
John C. Stennis Space Center

QUIT



World Trade Center & Vacinity
Pre Event Image
Data source: Unknown
Data provided by ESRI, Inc.

100 0 100 200 300 Feet

World Trade Center & Vacinity
Post Event Damage
Data source: EarthData, Inc.
Data acquired 9-19-01

Earth Science Applications Directorate
John C. Stennis Space Center

QUIT

World Trade Center Disaster Area

New York City, New York

Imaged September 27, 2001

Earth Science Applications Directorate
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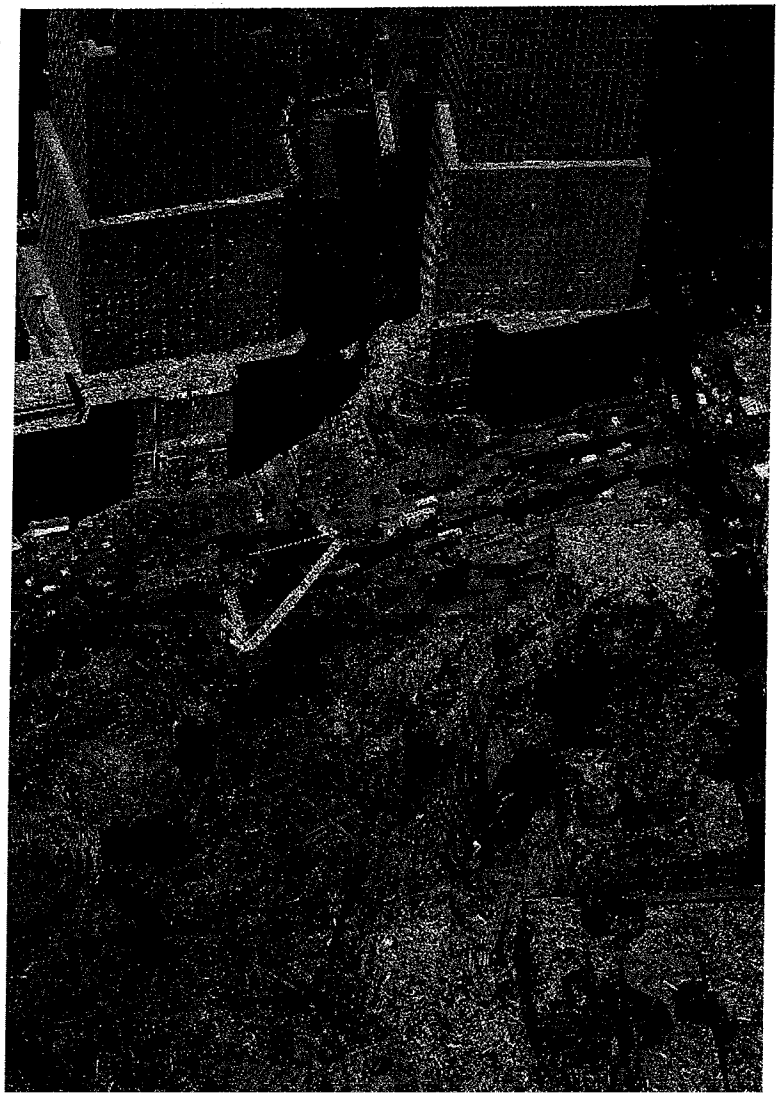

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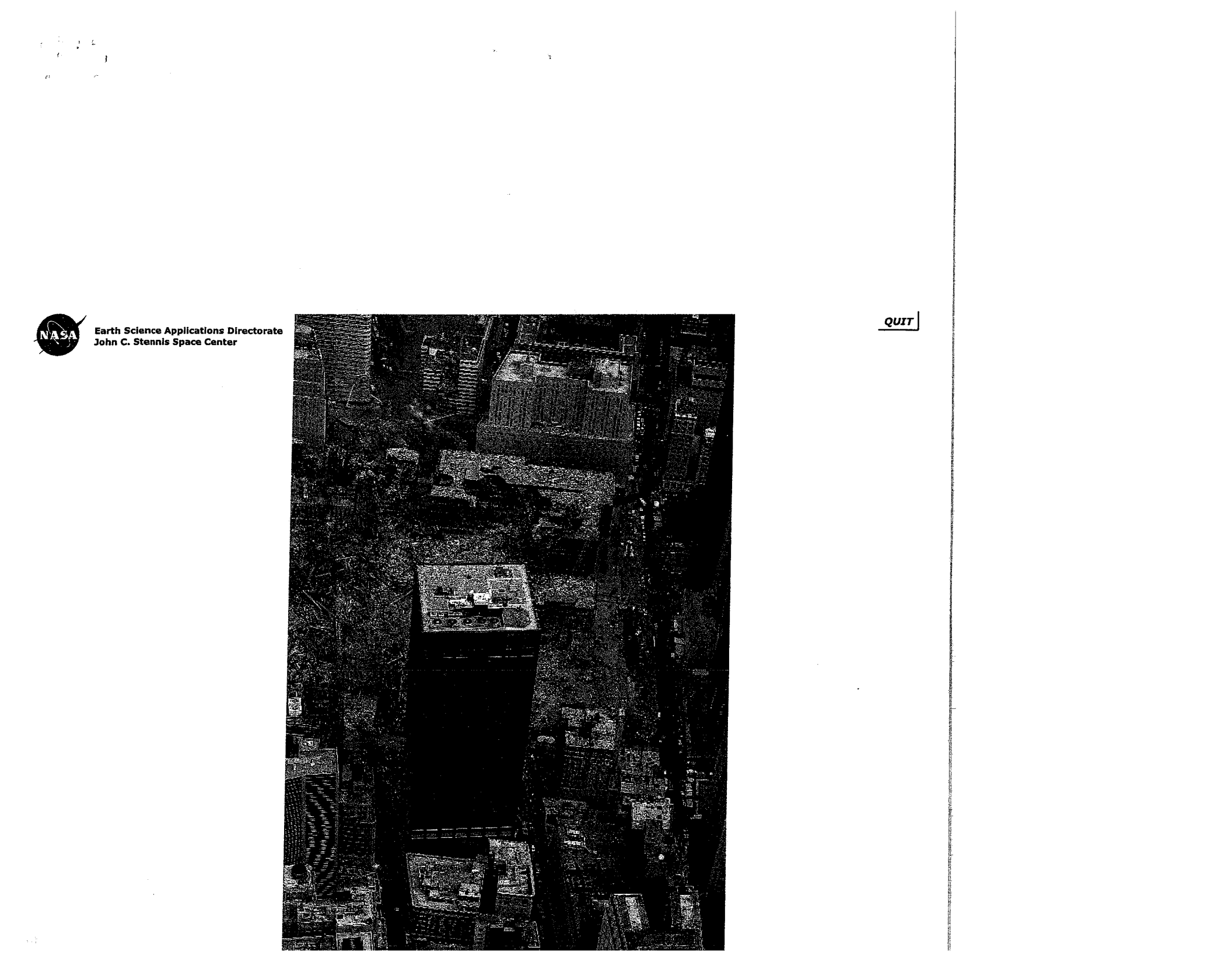

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